Evidence Appendix A

COMPUTER APPARATUS AND METHOD FOR TRADING AND CLEARING FUTURES CONTRACTS TO ACCOMMODATE A VARIABLE SENSITIVITY RELATED TO THE GENERAL LEVEL OF INTEREST RATES

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I. TECHNICAL FIELD OF THE INVENTION

The present invention is in the field of digital electrical apparatus and methods for making and using the same, and products produced thereby. More particularly, the present invention is directed to a digital electrical apparatus and methods for data processing and data management having particular utility in the field of futures. Still more particularly, the present invention pertains to a method for making and using a digital electrical apparatus to process digital electrical signals to for trading and clearing futures contracts with a variable price sensitivity related to the general level of interest rates.

II. BACKGROUND OF THE INVENTION

For several years now, banks in the United States and in most developed nations have provided interest rate risk management products to their customers in the form of privately negotiated contracts commonly referred to as over the counter derivatives. These contracts have allowed both corporations and individuals to transfer unwanted risk exposure to changes in the general level of interest rates from themselves to their banks. By helping corporations and individuals manage their exposure to fluctuating interest rates, these derivatives have greatly improved the ability of global capital markets to distribute capital more efficiently and at reduced cost to both borrower and lender.

Banks are able to offer these products to their customers due to the fact that a variety of financial instruments have been developed which provide protection for the banks while they act as a conduit for the transfer of risk. Ultimately, the banks attempt to pass on the risk that they received from one customer, to another customer who can benefit from it. However, the financial instruments used to transfer the risk are limited in their ability to immunize banks from certain kinds of risks that they have accepted from their customers. As the world witnessed during the fall of 1998, interest rate markets can be very volatile and banks can still be very vulnerable to losses.

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To fully understand the deficiencies in existing computer systems that provide support to futures exchanges where many of the financial instruments trade, a short explanation of the development and structure of those financial products is provided. In a typical interest rate derivative transaction, a bank will assume the interest rate exposure that a particular customer wishes to transfer, and the bank will collect a fee for this service. The ultimate goal of the bank is to intermediate between two customers with opposite needs. For example, the bank would like to find one customer who needs protection from rising interest rates and another customer who needs protection from declining interest rates. After the bank has assumed the exposure of one customer, but before it has had the opportunity to find the second customer with a need for the exposure, the bank will attempt to mitigate the risk associated with this exposure by utilizing one or more instruments that are available in the financial markets. These are referred to as hedge instruments.

Hedge instruments typically include: United States Treasury bonds and notes; futures contracts on these bonds and notes (traded at The Chicago Board of Trade), and Eurodollar futures contracts (traded at the Chicago Mercantile Exchange). While far from being a perfect hedge, these instruments have proven themselves capable of providing some interim protection from various interest rate risk exposures while the bank seeks to identify a customer who would benefit from said exposure. Once the second customer is identified, the bank will attempt to transfer the exposure to the second customer. If the second customer is agreeable, the bank will then transfer the risk and remove the temporary hedge that it had put on in the form of a purchase (or sale) of notes, bonds, or futures. The bank is then left with two interest rate derivative contracts, providing it with offsetting exposures to movements in interest rates. In effect, the bank has inter mediated between two of its customers, provided each with valuable risk management, and taken a fee for its efforts.

The following discussion is focused on the instruments available in

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the financial markets today for use by the banks for temporary or interim

hedging. Each of the currently available instruments has certain advantages and

disadvantages. The following evaluation of these instruments is based on two

criteria: cost and utility.

Eurodollar futures provide a somewhat effective hedge due to the

fact that their price responds to changes in LIBOR interest rates, and most

interest rate derivatives are designed to transfer LIBOR risk from one entity to

another. LIBOR is an acronym for London Interbank Offered Rate, a benchmark

rate published in London every business day, and the most commonly used rate

in commercial lending to price floating rate loans. Eurodollar futures provide a

very cost effective hedge for a bank during the period that a bank seeks to

permanently offset their exposure with either another customer or another bank.

In addition to being sensitive to changes in LIBOR interest rates, Eurodollar

futures have another very valuable design feature. They are designed to cover a

period of only three months each, so that a bank can construct a hedge to match

the term of its derivative contract. For example, if a bank enters into a derivative

contract for a period of thirty months, the bank could buy (or sell) a string of ten

Eurodollar futures, starting today and ending thirty months from today, with each

contract covering a period of three months. This feature means that Eurodollars

futures afford banks the most flexibility when hedging their interest rate risk.

The next kind of instruments includes United States Treasury

(Treasury) bonds and notes. These two instruments are identical with the

exception of time to maturity. Notes mature in ten years or less while bonds

mature in ten years or more. For purposes of this discussion we will use the

term "t-notes" to refer to both instruments. The primary advantage of t-notes for

use as a hedge is that they do possess convexity very similar to the convexity

exhibited by interest rate derivatives. Therefore, a bank utilizing t-notes to hedge

its interest rate exposure would not be required to adjust the quantity of t-notes it

had bought or sold as interest rates fluctuate from day to day. The primary

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drawback to t-notes for use as a hedge is that their price responds to changes in treasury interest rates rather than LIBOR interest rates. This is a major problem since the correlation between LIBOR interest rates and treasury interest rates is historically very low. In other words, LIBOR rates can change, affecting the value of the derivative, while treasury rates remain unchanged and therefore the value of the hedge remains unchanged. T-notes are commonly utilized to hedge interest rate derivatives which mature in three years or more, despite the fact that their use leaves a bank exposed to changes in the relationship between LIBOR interest rates and treasury interest rates. The other major problem with the use of t-notes to hedge interest rate derivatives is their lack of flexibility. Typically, there are just four t-notes available for use as a hedge. There are t-notes maturing in 2, 5, 10, and 30 years. There are, of course, many other t-notes available, but they are difficult to buy and sell efficiently. The four t-notes mentioned above are known as the "on the run" notes and the vast majority of the buying and selling in t-notes involves these four issues.

The third instrument, or group of instruments, is futures contracts on t-notes. These also are traded at the Chicago Board of Trade. The use of these contracts to hedge interest rate exposure is very limited due to the fact that these instruments possess the same disadvantages as t-notes but also possess an additional feature known as basis risk. The term "basis risk" refers to the fact that the value of these contracts is based on a formula which causes these contracts to have a very strong relationship with a specific t-note issued by the United States Treasury, and then to switch from time to time to a different specific t-note. This basis risk, along with the drawbacks that these instruments share with t-notes, causes them to be used very rarely by banks as a hedge for interest rate derivatives.

In addition to the hedge instruments in existence and in use for U.S. dollar denominated interest rate derivatives, their are two other hedge instruments available; one for Australian dollar denominated derivatives and one

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for Deutsche mark denominated derivatives. These are described because they are considered to be prior art.

The London International Financial Futures and Options Exchange (LIFFE) currently offers a product which it calls the Libor Financed Bond. This product was created by the LIFFE in an attempt to provide a hedge for Deutsche mark denominated, LIBOR based, interest rate derivatives. The Libor Financed Bond exhibits the convexity of an interest rate derivative, like t-notes, while at the same time providing price sensitivity to LIBOR interest rates. The Libor Financed Bond does not, however, provide the banks with the flexibility that Eurodollar futures do. The contract covers an interest period of either five years or ten years, compared to the three month period that the Eurodollar futures cover. The result is that the contract precludes banks from an optimal hedging of their interest rate exposure.

The other known prior art includes the Commonwealth Treasury Bond Future which is listed and traded at the Sydney Futures Exchange (SFE) in Australia. This futures contract is designed to be sensitive to changes in the yield on ten year and three year Australian Government Bonds. The contract price is equal to 100 minus the yield on a hypothetical ten year and three year bond. The tick value of this contract varies with the yield of the bond, and the tick values are prescribed in a table published by the SFE. It is this variable tick value which confers upon the contract the convexity which the actual Australian Government Bonds possess. So these contracts posses convexity, which is the inventor herein believes to be desirable, but they are not sensitive to LIBOR interest rates and they do not provide the flexibility that shorter contracts like three month Eurodollar futures contracts do.

III.   **SUMMARY OF THE INVENTION**

We have devised and designed an improved computer system for handling futures contracts trading and clearing. The improvement extends the capability of prior systems so as to accommodate and support a new financial

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product that we have named the FRA (Forward Rate Agreement) futures contract. A FRA can provide banks and investment banks with a financial instrument that they can utilize as a hedge for their LIBOR interest rate exposure. The IRA futures contract overcomes the deficiencies in existing instruments, as described above, and will make capital markets and the distribution of capital in the United States and all other developed nations more efficient. However, in order to trade and clear the FRA futures contract effectively requires a complex and sophisticated computer system. To fully appreciate the advances made in this computer system requires a brief explanation of the FRA futures contract itself. However, it is noted that the principles of the present invention are applicable to the trading and clearing of futures contracts other than the FRA futures contract. It is further noted that the FRA futures contract, and the computer system which supports the trading and clearing of the FRA futures contract, are applicable to any currency including, but not limited to, Japanese yen, British pound, French franc, Swiss Franc, Deutsche mark, European Currency Unit, Canadian dollar, Mexican peso, Russian ruble, etc. It is further noted that the FRA futures contract, and the computer system which is required to support the trading and clearing of the FRA futures contract, are applicable to any maturity of LIBOR. The most commonly referenced maturity is three months, but any maturity from one month to twelve months is applicable. It is further noted that the FRA futures contract, and the computer system which can be used to support the trading and clearing of the IRA futures contract, are applicable to any interest rate index. The most commonly referenced index for commercial lending is currently LIBOR, but Prime, Fed funds and commercial paper as used in the over the counter derivatives markets and described by the International Swap Dealers Association Handbook are applicable.

The FRA futures contract provides a completely new financial instrument for banks, and any other potential users, for use in hedging their

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LIBOR based interest rate exposure in a more cost effective, secure and robust way. The FRA futures contract will address all the major needs of a bank which seeks an instrument to hedge its LIBOR based interest rate exposure. The price of the IRA futures contract responds to changes in LIBOR interest rates, thus the

5   user will not be exposed to the low correlation between LIBOR rates and United States Treasury interest rates, as they are currently when utilizing t-notes to hedge their interest rate exposure. The FRA futures contract covers an interest period of three months so that it provides flexibility in constructing a hedge for an interest rate derivative contract. The significant and innovative difference

10   between the FRA futures contract and the Eurodollar futures contract is the Present Value Factor (PVF). By adding this feature to the contract specifications and applying this PVF to the tick value (dollar value of a minimum change in the price of the futures contract), we have added the critical attribute of convexity to this instrument.

15   In order to understand the role that the PVF plays, it is necessary to understand a little bit about the mechanics of the interest rate derivative market. When a bank enters into an over the counter interest rate derivative contract, the bank agrees to either pay, or be paid, an amount of money based on the prevailing market rate for three month LIBOR on some date in the future.

20   That amount of money is called a floating rate payment. If the bank does not wish to accept the uncertainty regarding what the level of three month LIBOR may be on some date in the future, it will endeavor to hedge its exposure to the rise and fall of three month LIBOR. A popular vehicle for this is the Eurodollar futures contract. If a bank had agreed to pay three month LIBOR on September

25   16th of next year, it could sell an appropriate quantity of September Eurodollar futures as a hedge. This hedge would be effective since the price of Eurodollar futures goes down as the three month LIBOR rate goes up, and any losses incurred by three month LIBOR rising would be offset by the price of September Eurodollars declining. The income statement for the bank on September 16th of

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next year would show a loss on the over the counter interest rate derivative and an equal, but opposite, gain on the September Eurodollar futures contract. There is a problem, however. The over the counter interest rate derivative contract, which the bank agreed to, requires payment only at the end of the term of the contract, while the Eurodollar futures contract requires payment everv day for any gains or losses incurred due the movement in the three month LIBOR rate. In other words, three month LIBOR could rise 10 percent and then fall 10 percent before the over the counter interest rate derivative contract expires and the bank would have no payment obligations under the terms of the over the counter interest rate derivative, while at the same time, the futures exchange would have paid the bank large sums of money when the LIBOR rate rose, and then would have demanded it back as the LIBOR rate went back to its original level. It is these mismatches in cash flows that cause the Eurodollar ftiturc to an ineffective hedge. Let us examine what would happen if three month LIBOR were to rise IO percent in June of next year. As three month LIBOR rose IO percent, the September Eurodollar future would decline by a like amount. The bank would be paid a sum of money by the futures exchange on the day that the rate moved. Since banks use the present value concept to report gains and losses in their derivative operations, the bank would report a gain on their Eurodollar futures position and a loss on their over the counter interest rate derivative position, but the loss on the derivative would be reported as the present value of the future cash flow, while the gain on the Eurodollar futures contract would be reported in its entirety. By definition, the loss on the derivative, present valued, would be less than the gain on the Eurodollar futures. It is this present value concept which causes the bank in our example to experience an imbalance between the derivative contract and the Eurodollar hedge. It is also this concept of present value that we are employing in our invention. The PVF will have the effect of making the gains or losses on the futures contracts equal to the gains and losses on the over the counter interest

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rate derivative contracts. Thus, instead of having a mismatch in the valuation of

the interest rate derivative contract versus the Eurodollar futures contract, the

bank would have the valuations of the interest rate derivative and the FRA

futures contract exactly offsetting each other. So, to summarize, banks currently

experience valuation mismatches between interest rate derivative contracts and

Eurodollar futures contracts due to the discounting of future cash flows on the

derivative versus the current cash flows on the Eurodollar futures contract. The

FRA futures contract has all the same characteristics that a Eurodollar future

was designed to include, but adds the critical feature of reducing the cash flows

by a discount factor we call a PVF. The payment that would be made by the

futures clearing entity in the above example would be multiplied by the PVF

appropriate for the date of payment, and therefore reduced.

A. Objects and Advantages

In view of the foregoing, the inventors herein have made a first

innovation in the field of futures that has created a need for a second innovation

in the field of computer science, the latter being the subject of this patent

application. Thus, an object of the invention for which a patent is sought is

overcoming some or all of the drawbacks indicated herein by a computerized

apparatus and method—all to aid in, and improve over, the efficiency, speed,

accuracy, and versatility of prior art systems.

It is another object of the present invention to provide an apparatus

(machine), method of making the machine, article of manufacture, necessary

intermediate data structures, method of using the machine, and products

produced by the method (collectively referenced herein as the method), wherein

the method includes using a digital electrical computer in convex futures contract

clearing

It is another object of the present inventon to provide for carrying

out the method including by providing a clearing computer system including a

digital electrical computer having a processor electrically connected to an input

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device for receiving input information and producing input electrical signals representing the input information, to an output device for producing a display corresponding to output electrical signals, and to a printer device for printing corresponding to the output electrical signals; and

programming the processor to form circuitry in the processor to control the computer system in signal processing responsive to the input electrical signals to produce other electrical signals including the output electrical signals.

It is still another object of the present invention to provide for carrying out the method in data processing substeps of receiving, as a portion of the input information, a base tick value for a convex futures contract, an expiration time for the convex futures contract, identification of a buyer of the convex futures contract, identification of a seller of the convex futures contract, a trade price for the convex futures contract, and a settlement price for the convex futures contract; computing a discount factor from the settlement price; determining an actual tick value by applying the discount factor to the base tick value; specifying an amount of money a clearing entity must transfer between the buyer and the seller for clearing the convex futures contract by applying the actual tick value to a difference between the trade price data and the settlement price; triggering a computer-assisted transfer of the amount of money; and generating, at the printing device, documentation including the computed amount of money transferred, in clearing the trade of the convex futures contract.

It is still another object of the present invention to provide for carrying out the method by applying a bootstrap method to the computing of the settlement price.

It is yet another object of the present invention, in any of the objects set out above, to provide for carrying out the method by determining an actual tick value includes applying the discount factor to the base tick value to produce a variable actual tick value.

It is yet another object of the present invention, in any of the

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objects set out above, to provide for carrying out the method by generating a

cumulative price quote for a group including another convex futures contract by

and displaying the cumulative price quote on the display device to convey

information for use in trading the group.

It is yet another object of the present invention, in any of the

objects set out above, to provide for carrying out the method by generating a

price for an floor option on the convex futures contract and by displaying the

price for the floor option on the display device to convey information for use in

trading the floor option.

It is yet another object of the present invention, in any of the

objects set out above, to provide for carrying out the method by accounting for a

limit, the limit from the group consisting of a cap, a floor, or both, in generating

the price.

It is an additional object of the present invention, in any of the

objects set out above, to provide for carrying out the method by facillitating

communicating data representing the convex futures contract from the clearing

computer system to a second digital electrical computer system and by using the

data in computing a price for an Over-The-Counter option.

It is an additional object of the present invention, in any of the

objects set out above, to provide for carrying out the method by forming an

interest rate swap including the convex futures contract including computing

interest payments for the interest rate swap with the second computer.

It is an additional object of the present invention, in any of the

objects set out above, to provide for carrying out the method by communicating

data representing the convex futures contract from the clearing computer system

to an other digital electrical computer system and by computing, with the other

digital electrical computer system, a zero coupon libor curve in real time and

applying the zero coupon libor curve to a portfolio of interest rate derivatives to

create forward rates, expected cash flows, and present value of the cash flows

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for risk management manipulation of the portfolio.

It is an additional object of the present invention, in any of the objects set out above, to provide for carrying out the method by calculating, with the other digital electrical computer system, an exposure indicia of movement in the curve.

It is an additional object of the present invention, in any of the objects set out above, to provide for carrying out the method by one or more in combination of the following: publishing daily quotes of the discount factor by clearing digital electrical computer system to provide information for use in trading the convex futures contract, publishing trading discount factor data in real time on a display board electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract, conveying trading discount factor data in real time to a plurality of vendor computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract, and conveying trading discount factor data in real time to a plurality of broker computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract.

It is an additional object of the present invention, in any of the objects set out above, to provide for carrying out the method by conveying trading discount factor data in real time to a plurality of customer computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract—and in response to a trade triggered from one of the customer computers, generating confirmation statement at the clearing digital electrical computer to document the trade triggered from one of the customer computers.

It is an additional object of the present invention, in any of the objects set out above, to provide for carrying out the method by making convex

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futures contract documentation made by the foregoing method, especially wherein the method involves applying a bootstrap method to the settlement price.

It is yet still an additional object of the present invention, in any of the objects set out above, to provide for carrying out the method by publishing price data for the convex futures contract.

B. Summary of the Invention

These and other objects of the present invention, as apparent from the specification as a whole, are carried out by providing an improved digital electrical computer apparatus and method for digital electrical machine-based computing capable of trading and clearing a sophisticated, next generation, futures contract such as the IRA futures contract. In particular, the computer system and method of the present invention provides machine-computational support for a futures contract with a tick value that varies with general level of interest rates. This futures contract would be available to banks and investment banks around the world for use in managing the risk associated with trading in over the counter interest rate derivative contracts.

The present invention involves a system performing several functions, which, when performed together, constitutes the trading, clearing and settlement of a financial futures contract. Generally, the system accepts data from the principles to all transactions consummated (e.g., on a particular day), keeps a running record of each principle's net position in each futures contract, performs a calculation which determines the price sensitivity of each futures contract to a given change in interest rates, and then calculates the appropriate transfer of funds between the principles involved in buying and selling the contract.

1. Determination of the Present Value Factor. At the end of a prescribed period of time, usually one day, a determination is made as to the closing price for each futures contract which is traded at a particular

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exchange or marketplace. This closing price is also known as the settlement price, and can be viewed as a fair representation of the price level which was prevalent in each futures contract at the prescribed time. This settlement price, or these settlement prices, is entered into an electronic input device which is connected to the clearing computer system. The first calculation to be performed by the clearing computer system utilizes the settlement price of the futures contract whose expiration date is closest to the current date. The calculation, which is detailed below, yields a result that we call the Present Value Factor (PVF). We refer to the first PVF as PVF1. The clearing computer system stores the value of PVF1 for use in subsequent calculations. The clearing computer repeats the process to determine PVF2 by utilizing the results of the first calculation and the settlement price of the futures contract whose expiration is next closest to the current date. The result of this second calculation is labeled PVF2 and also is stored. This process is repeated until there is a PVF for each futures contract listed by the exchange. ('Listed' is a term that means that a contract is available for trading and clearing). In other words, if there are futures contracts traded, e.g., with expiration dates in March, June, September and December in each of the next ten years, then this calculation is repeated forty times and the results would be PVF1 through PVF40. The process is analogous to building a pontoon bridge across a river; in order to build the next section of bridge, you must use all of the preceding sections to get to it.

        2.   Determination of the Actual Tick Value (ATV). After the clearing computer system has read the settlement prices for all the futures contracts and performed the calculation that yields the PVF for each of the futures contracts, the next step is for the clearing computer system to calculate the Actual Tick Value for each futures contract. The ATV is calculated by multiplying the Base Tick value, which is maintained in the clearing computer memory, by the PVF. Each futures contract (i.e., March 1999, June 1999, September 1999) is assigned an ATV. The ATV for the futures contract expiring

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closest to the current date will be labeled ATV1. The ATV will be an integral part of the next step, which will be the calculation of the settlement amounts do to/from the buyers and sellers of the futures contracts.

3.   Determination of the settlement amount. Once the clearing computer system has assigned an ATV to each listed futures contract, the clearing computer system calculates the settlement amounts. A1 settlement amount is the amount of money which must be paid by those individuals or organizations who lost money on any given day, or, the amount of money which will be sent from the clearing entity to those individuals or organizations who made money on any given day. In order to determine this amount, several pieces of information must be either stored in or sent to the clearing computer system: (1) the number of contracts an individual or organization had net bought or sold by the end of the previous day, (2) the number of contracts an individual or organization bought or sold during the current day, (3) the price at which the individual or organization bought or sold during the current day, (4) the settlement price for each futures contract for the previous day, (5) the settlement price for each futures contract for the current day, (6) the Actual Tick Value(ATV) for the current day for each futures contract.

More specifically, and viewed from a different perspective, the system includes using a digital electrical computer in convex futures contract clearing, the method including the steps of: providing a clearing computer system including a digital electrical computer having a processor electrically connected to an input device for receiving input information and producing input electrical signals representing the input information, to an output device for producing a display corresponding to output electrical signals, and to a printer device for printing corresponding to the output electrical signals; and programming the processor to form circuitry in the processor to control the computer system in signal processing responsive to the input electrical signals to produce other electrical signals including the output electrical signals, in data

processing substeps of: receiving, as a portion of the input information, a base

tick value for a convex futures contract, an expiration time for the convex futures

contract, identification of a buyer of the convex futures contract, identification of

a seller of the convex futures contract, a trade price for the convex futures

contract, and a settlement price for the convex futures contract; computing a

discount factor from the settlement price; determining an actual tick value by

applying the discount factor to the base tick value; specifying an amount of

money a clearing entity must transfer between the buyer and the seller for

clearing the convex futures contract by applying the actual tick value to a

difference between the trade price data and the settlement price; triggering a

computer-assisted transfer of the amount of money; and generating, at the

printing device, documentation including the computed amount of money

transferred, in clearing the trade of the convex futures contract.

In the foregoing system, the substep of computing a discount factor

can include the substep of applying a bootstrap method to the settlement price.

In any of the foregoing, the substep of determining an actual tick

value can include applying the discount factor to the base tick value to produce a

variable actual tick value.

In any of the foregoing, it is possible to include the substeps of:

generating a cumulative price quote for a group including another convex futures

contract; and displaying the cumulative price quote on the display device to

convey information for use in trading the group.

In any of the foregoing, it is also possible to include generating a

price for an floor option on the convex futures contract; and displaying the price

for the floor option on the display device to convey information for use in trading

the floor option.

In the foregoing system, the step of generating a price can include

accounting for a limit, the limit from the group consisting of a cap, a floor, or both,

in generating the price.

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In any of the foregoing, it is also possible to include communicating data representing the convex futures contract from the clearing computer system to a second digital electrical computer system; and using the data in computing a price for an Over-The-Counter option.

In any of the foregoing, the forming an interest rate swap including the convex futures contract can include computing interest payments for the interest rate swap with the second computer.

In any of the foregoing, it is further quite viable to include communicating data representing the convex futures contract from the clearing computer system to an other digital electrical computer system; and computing, with the other digital electrical computer system, a zero coupon libor curve in real time and applying the zero coupon libor curve to a portfolio of interest rate derivatives to create forward rates, expected cash flows, and present value of the cash flows for risk management manipulation of the portfolio.

In any of the foregoing, it is possible to further include calculating, with the other digital electrical computer system, an exposure indicia of movement in the curve.

In any of the foregoing, further possible to include one or any combination of the following: publishing daily quotes of the discount factor by clearing digital electrical computer system to provide information for use in trading the convex futures contract, publishing trading discount factor data in real time on a display board electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract, conveying trading discount factor data in real time to a plurality of vendor computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract, and conveying trading discount factor data in real time to a plurality of broker computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract.

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In any of the foregoing, it is additionally possible to include
conveying trading discount factor data in real time to a plurality of customer
computers electrically connected to the clearing digital electrical computer
system to provide information for use in trading the convex futures contract; and
in response to a trade triggered from one of the customer computers, generating
confirmation statement at the clearing digital electrical computer to document the
trade triggered from one of the customer computers.

It should be clear that the system includes a convex futures
contract documentation made by the process set out above, especially wherein
the substep of computing a discount factor includes applying a bootstrap method
to the settlement price. Of course in any of the above, it is best to carrty out the
publishing as including price data.

C.   **Brief Description of the Drawings**

FIG. 1 is an overview of the structure of the present invention.
FIG. 2 is a flow chart for the present invention.

IV.   **DETAILED DESCRIPTION OF A PREFERRED EMBODIMENT**

Figure 1 shows, in block diagram form, the computer-based
elements which can be utilized to implement the present invention. The present
invention involves computer system 1, which includes processor circuitry 2 in a
digital electrical computer 4. For flexibility, it is preferable to have the processor
circuitry 2 formed by means of a computer program programming programmable
circuitry, i.e., programming the computer (processor). The programming can be
carried out with a computer program (or programs) 6, which for flexibility should
be in the form of software stored in an external memory 8, such as a diskette,
hard disk, virtual disk, or the like. (The virtual disk is actually an extended
internal memory 10 that may assist in speeding up computing.) A diskette
approach is optional, but it does provide a useful facility for inputting or storing
data structures that are a product produced by the host software, as well as for

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inputting a software embodiment of the present invention. Of course storing the computer program 6 in a software medium is optional because the same result can be obtained by replacing the computer program in a software medium with a hardware storage device, e.g., by burning the computer program 6 into a ROM, using conventional techniques to convert software into an ASIC or FPGA, etc., as would be understood by one having a modicum of skill in the arts of computer science and electrical engineering. (It is well known in the art of computer science that it is a trivial technical exercise to go from specific hardware to software or vice versa. See, for example, James R. Goodman, Todd E. Marlette, and Peter K. Trzyna, "The Alappat Standard for Determining That Programmed Computers are Patentable Subject Matter," J.P.T.O.S. October 1994, Volume 76, No. 10, pages 771 - 786, and James R. Goodman, Todd E. Marlette, and Peter K. Trzyna, "Toward a Fact-based Standard for Determining Whether Programmed Computers are Patentable Subject Matter," J.P.T.O.S. May 1995, Vol. 77, No. 5, pages 353 - 367, both of which are incorporated by reference.) In this regard, it should also be noted that "input" can include inputting data for processing by the computer program 6 or inputting in the computer program 6 code itself.

An internal memory 10 works in cooperation with the external memory 8. An input device 12 could be a keyboard or equivalent means for a user to input the data discussed below. A visual display unit 14 can be employed for a visual representation, and a printer 16 can be employed for producing hard copy output 22. Note that output electrical data can also be stored to memory 8.

For such an embodiment, an IBM-compatible PC could work or such a computer system as is used at the Chicago Board of Trade, or the like. The input device 12, or a representative one of many, can be any ANSI standard terminal, and the visual display unit 14 can be a Trinatron color monitor. Still other alternatives include using a network of other computers or a mini-computer

or a mainframe system. With such larger scale approaches, the external memory 8 could be a tape or a CD ROM for data retrieval. A VAX or Microvax system running VMS 5.0 or later is an acceptable approach.

As indicated above, an embodiment could also be carried out in hardware, though this is not recommended as it is an inflexible approach. Accordingly, a hardware implementation is described here for exemplary purposes. Of course it is well known that a computer program can be stored in hardware by many approaches, not the least of which is burning it into a ROM. More sophisticated than burning a ROM, but also entirely conventional, is to use techniques to translate the computer program 6 into an ASIC or a chip that will carry out the invention in an equivalent manner, and if fact with equivalent circuitry to that formed by programming programmable computer circuitry. It is all just digital electrical circuitry processing digital electrical signals, transforming them to output different electrical signals.

The present invention can best be implemented by utilizing a database 20 of files (or an equivalent, e.g., records, a relational database, etc.) pertaining to the present invention as discussed herein. In Figure 1, respective dotted lines between database 20 and input device 12, and between computer program 6 and input device 12 illustrate that the computer program 6 and contents of database 20 can be obtained from data input at the input device 12, which converts the respective input data into respective electrical signals for handling by the digital electrical computer 4, and processor 2, including storing the respective digital electrical signals in the memories 8 and 10. Output electrical data, in the form of digital electrical signals, is generated by the processor 2 processing the input electrical data in a manner specified by the executable program 6, such that when operated, the system 1 as a whole produces a tangible presentation, such as that represented in Figure 1 as documentation 22, including such documents as a Confirmation Statement, an equity run, reports, P&L cash flows, and other docments showing the identity or

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kind of the contracts, the number of contracts, and the price for the contracts.

There can be various kinds of input data 21 or information, including settlement price data 23, base tick value price data 24, expiration date data 25, expiration time data 26, identification of buyer data 27, identification of seller data 28, trade price data 29, and other data, which could include other computer programs, local files 24 (files specific to a particular user and not available to other users), data files corresponding to a user, utilities, reference files, etc.

More particularly, the input data 21 can include settlement price data 23 of the contract. This includes the price that is determined to be the representative price that last traded when the contract closed at the end of the period of time specified by the exchange (e.g., at the end of every hour, or at a specified time every day).

The input data 21 also can include the base tick value price data 24. This includes the dollar value for a minimum change in the price of the contract. For example, if the minimum price change is defined to be .01 and the tick value is $25.00, then a three tick move from 96.03 to 96.06 would result in a gain or loss of $75.00.

The input data 21 also can include the contract expiration date data 25 and the expiration time data 26. These can include the prescribed date and time when the contract stops trading and settlement must be made.

The input data 21 also can include the identification of buyer data 27, which includes the buyer--the name of the individual or organization which will benefit from an increase in the price of the contract.

The input data 21 also can include the Identification of the seller data 28, which includes the name of the individual or organization which will benefit from an decrease in the price of the contract.

The input data 21 also can include the trade price data 29: the price at which the buyer and seller agreed to contract the obligation.

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The above information is transmitted to the clearing computer via modem or other appropriate means. The information is then processed by the clearing computer as illustrated in FIG. 2, as follows.

STEP I

In block 50, the clearing computer 4 calculates the Present Value Factor (PVF). The mathematical formula is as follows: This is preferably a multi-step process that is done for each contract expiration.

STEP 2

In block 52, after the PVF has been calculated, the clearing computer 4 determines the Actual Tick Value (ATV) by multiplying the Base Tick Value by the PVF. The result is the ATV. Again, this step must be completed for each contract expiration.

STEP 3

In block 54, the clearing computer 4 calculates the settlement amount that is due to the buyer from the seller or to the seller from the buyer. The calculation is a matter of determining if the contract settlement price was above or below the trade price, and then determining how much money is due which party. The formula for the buyer's settlement amount is as follows:

$B = (Ps - Pt)*ATV*100$

where B = Settlement due to (from) buyer

Ps = settlement price

Pt = trade price

ATV = actual tick value

and the formula for the seller's settlement amount is as follows:

$S = (Pt - P,)*ATV*100$

where S = Settlement due to (from) seller

Ps = settlement price

Pt = trade price

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ATV = actual tick value

This step, like the others, is preferably repeated thousands of times in order for it to be useful.

STEP 4

In block 56, the clearing computer 4 triggers a computer-assisted transfer of funds from the bank accounts of the buyers or sellers who lost money and to the bank accounts of the buyers and sellers who made money.

STEP 5

In block 58, the clearing computer 4 generates and sends output to the printer and to terminals in the offices of trading firms who do business with the clearing corporation. This output includes a record of each trade, called a confirmation, the settlement price of each contract expiration and the settlement amount, or amount of money due to, or due from, each trading firm.

The programmed processor circuitry 2 uses the data 21, which represents some or all of the information or data input by the user to produce output data in a digital electrical form of a string of bits which correspond to processed data. The processor circuitry 2 carries out its operations by using at least one "filter", which can be characterized as an analysis or process restricted by a precise definition. Elements of the definition can be characterized by at least one logical operator or operand to indicate the precise definition or process to be carried out, e.g., whether the union or intersection of two elements or the complement of an element is required. The term "filter" is also applied to the process of applying this definition to change, create, or generate, or exclude data other than that defined from subsequent processing.

This invention can also be implemented by utilizing at least one pointer to insert a computed piece of data into the preformatted text of the above-referenced documentation in the appropriate data file(s). Alternatively, a plurality of pointers can be logically linked so that the output electrical data can be inserted in a plurality of locations in the aforementioned documentation 22.

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The computer program 6 controlling the digital electrical computer 4 checks for

the pointer(s) to ascertain whether any electrical output data should be inserted

in generating the documentation 22. This is preferable to an approach of doing

the computing described in Figure 2 and then manually entering the computed

5   amounts on printed documentation preformatted to accommodate the inserted

amounts.

In Figure 1, dotted box 32 represents a detailed view of a first

computer system. For the sake of brevity, it should be understood that related

computer systems 32A, 32B, 32C have much the same structure, except of

10   course that the respective computers have respectively programmed processors

with corresponding circuitry unique to their functions. Thus, it should be

understood that 32A, 32B, and 32C have respective monitors, input devices,

output devices, links to network 18 (e.g., the Internet, an intranet, dedicated

lines, etc.).

15   Accordingly, as set out above and shown in the figures, the present

invention includes a method for using a digital electrical computer in convex

futures contract clearing, as well as a method for making digital circuitry, data

structures as necessary intermediates, and the apparatus itself. With this

understanding, for the sake of brevity, the following discussion is made with

20   reference to the method of use. The method includes the steps of: providing a

clearing computer system including a digital electrical computer having a

processor electrically connected to an input device for receiving input information

and producing input electrical signals representing the input information, to an

output device for producing a display corresponding to output electrical signals,

25   and to a printer device for printing corresponding to the output electrical signals;

and programming the processor to form circuitry in the processor to control the

computer system in signal processing responsive to the input electrical signals to

produce other electrical signals including the output electrical signals, in data

processing substeps of: receiving, as a portion of the input information, a base

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method can be carried out further including: communicating data representing the convex futures contract from the clearing computer system to a second digital electrical computer system; and using the data in computing a price for an Over-The-Counter option. In such case, the forming an interest rate swap including the convex futures contract can include computing interest payments for the interest rate swap with the second computer.

Additionally, in any of the foregoing, alternatively, or in combination, the method can be carried out further including: communicating data representing the convex futures contract from the clearing computer system to an other digital electrical computer system; and computing, with the other digital electrical computer system, a zero coupon libor curve in real time and applying the zero coupon libor curve to a portfolio of interest rate derivatives to create forward rates, expected cash flows, and present value of the cash flows for risk management manipulation of the portfolio. In such a case, the method can further include: calculating, with the other digital electrical computer system, an exposure indicia of movement in the curve.

Yet additionally in any of the foregoing, alternatively, or in combination, the method can be carried out further including: publishing daily quotes of the discount factor by clearing digital electrical computer system to provide information for use in trading the convex futures contract; publishing trading discount factor data in real time on a display board electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract; conveying trading discount factor data in real time to a plurality of vendor computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract; conveying trading discount factor data in real time to a plurality of broker computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract; and/or conveying trading discount factor data in real time to a

plurality of customer computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract--and   in response to a trade triggered from one of the customer computers--generating confirmation statement at the clearing digital electrical computer to document the trade triggered from one of the customer computers.

Preferably, the present invention is viewed as extending to convex futures contract documentation made by the process including: providing a clearing computer system including a digital electrical computer having a processor electrically connected to an input device for receiving input information and producing input electrical signals representing the input information, to an output device for producing a display corresponding to output electrical signals, and to a printer device for printing corresponding to the output electrical signals; and programming the processor to form circuitry in the processor to control the computer system in signal processing responsive to the input electrical signals to produce other electrical signals including the output electrical signals, in data processing substeps of: receiving, as a portion of the input information, a base tick value for a convex futures contract, an expiration time for the convex futures contract, identification of a buyer of the convex futures contract, identification of a seller of the convex futures contract, a trade price for the convex futures contract, and a settlement price for the convex futures contract; computing a discount factor from the settlement price; determining an actual tick value by applying the discount factor to the base tick value; specifying an amount of money a clearing entity must transfer between the buyer and the seller for clearing the convex futures contract by applying the actual tick value to a difference between the trade price data and the settlement price; triggering a computer-assisted transfer of the amount of money; and generating, at the printing device, documentation including the computed amount of money transferred, in clearing the trade of the convex futures contract. In such case,

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the documentation can be made by the process wherein the substep of computing a discount factor includes applying a bootstrap method to the settlement price. However, in any case, preferably, the invention extends to publishing price data.

5   While the above description contains many specificities, these should not be construed as limitations on the scope of the invention, but rather as an exemplification of one preferred embodiment thereof. Many other variations are possible such as, but not limited to, those described in the Objects and Advantages section above. Thus, the scope of the invention should be

10   determined by the appended claims and their legal equivalents, rather than by the principal embodiment and other examples described above.

V.   I CLAIM:

1.   A method for using a digital electrical computer in convex futures contract clearing, the method including the steps of:

providing a clearing computer system including a digital electrical computer having a processor electrically connected to an input device for receiving input information and producing input electrical signals representing the input information, to an output device for producing a display corresponding to output electrical signals, and to a printer device for printing corresponding to the output electrical signals; and

programming the processor to form circuitry in the processor to control the computer system in signal processing responsive to the input electrical signals to produce other electrical signals including the output electrical signals, in data processing substeps of:

receiving, as a portion of the input information, a base tick value for a convex futures contract, an expiration time for the convex futures contract, identification of a buyer of the convex futures contract, identification of a seller of the convex futures contract, a trade price for the convex futures contract, and a settlement price for the convex futures contract;

computing a discount factor from the settlement price;

determining an actual tick value by applying the discount factor to the base tick value;

specifying an amount of money a clearing entity must transfer between the buyer and the seller for clearing the convex futures contract by applying the actual tick value to a difference between the trade price data and the settlement price;

triggering a computer-assisted transfer of the amount of money; and

generating, at the printing device, documentation including the computed amount of money transferred, in clearing the trade of the convex

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futures contract.

2.   The method of claim 1, wherein the substep of computing a discount factor includes the substep of applying a bootstrap method to the settlement price.

3.   The method of claim 1, wherein the substep of determining an actual tick value includes applying the discount factor to the base tick value to produce a variable actual tick value.

4.   The method of claim 2, further including the substeps of:
generating a cumulative price quote for a group including another convex futures contract; and
displaying the cumulative price quote on the display device to convey information for use in trading the group.

5.   The method of claim 2, wherein:
generating a price for an floor option on the convex futures contract; and
displaying the price for the floor option on the display device to convey information for use in trading the floor option.

6.   The method of claim 5, wherein the step of generating a price includes accounting for a limit, the limit from the group consisting of a cap, a floor, or both, in generating the price.

7.   The method of claim 2, further including:
communicating data representing the convex futures contract from the clearing computer system to a second digital electrical computer system; and

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using the data in computing a price for an Over-The-Counter option.

8.   The method of claim 7, wherein the forming an interest rate swap including the convex futures contract includes:

computing interest payments for the interest rate swap with the second computer.

9.   The method of claim 2, further including:

communicating data representing the convex futures contract from the clearing computer system to an other digital electrical computer system; and

computing, with the other digital electrical computer system, a zero coupon libor curve in real time and applying the zero coupon libor curve to a portfolio of interest rate derivatives to create forward rates, expected cash flows, and present value of the cash flows for risk management manipulation of the portfolio.

10.   The method of claim 9, further including:

calculating, with the other digital electrical computer system, an exposure indicia of movement in the curve.

11.   The method of claim 2, further including:

publishing daily quotes of the discount factor by clearing digital electrical computer system to provide information for use in trading the convex futures contract.

12.   The method of claim 2, wherein:

publishing trading discount factor data in real time on a display board electrically connected to the clearing digital electrical computer system to

provide information for use in trading the convex futures contract.

13.   The method of claim 2, wherein:

conveying trading discount factor data in real time to a plurality of vendor computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract.

14.   The method of claim 2, wherein:

conveying trading discount factor data in real time to a plurality of broker computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract.

15.   The method of claim 2, wherein:

conveying trading discount factor data in real time to a plurality of customer computers electrically connected to the clearing digital electrical computer system to provide information for use in trading the convex futures contract; and

in response to a trade triggered from one of the customer computers, generating confirmation statement at the clearing digital electrical computer to document the trade triggered from one of the customer computers.

16.   Convex futures contract documentation made by the process including:

providing a clearing computer system including a digital electrical computer having a processor electrically connected to an input device for receiving input information and producing input electrical signals representing the input information, to an output device for producing a display corresponding to output electrical signals, and to a printer device for printing corresponding to the

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output electrical signals; and

programming the processor to form circuitry in the processor to control the computer system in signal processing responsive to the input electrical signals to produce other electrical signals including the output electrical signals, in data processing substeps of:

receiving, as a portion of the input information, a base tick value for a convex futures contract, an expiration time for the convex futures contract, identification of a buyer of the convex futures contract, identification of a seller of the convex futures contract, a trade price for the convex futures contract, and a settlement price for the convex futures contract;

computing a discount factor from the settlement price;

determining an actual tick value by applying the discount factor to the base tick value;

specifying an amount of money a clearing entity must transfer between the buyer and the seller for clearing the convex futures contract by applying the actual tick value to a difference between the trade price data and the settlement price;

triggering a computer-assisted transfer of the amount of money; and

generating, at the printing device, documentation including the computed amount of money transferred, in clearing the trade of the convex futures contract.

17.   The documentation of claim 16, wherein the substep of computing a discount factor includes applying a bootstrap method to the settlement price.

18.   The method of any one of claims 11-15, wherein the publishing includes publishing price data.

VI.   ABSTRACT

A machine, method for making the machine, method for using the machine, article of manufacture, and products produced by the method using a digital electrical computer in convex futures contract clearing, the method including the steps of: providing a clearing computer system including a digital electrical computer having a processor electrically connected to an input device for receiving input information and producing input electrical signals representing the input information, to an output device for producing a display corresponding to output electrical signals, and to a printer device for printing corresponding to the output electrical signals; and programming the processor to form circuitry in the processor to control the computer system in signal processing responsive to the input electrical signals to produce other electrical signals including the output electrical signals, in data processing substeps of: receiving, as a portion of the input information, a base tick value for a convex futures contract, an expiration time for the convex futures contract, identification of a buyer of the convex futures contract, identification of a seller of the convex futures contract, a trade price for the convex futures contract, and a settlement price for the convex futures contract; computing a discount factor from the settlement price; determining an actual tick value by applying the discount factor to the base tick value; specifying an amount of money a clearing entity must transfer between the buyer and the seller for clearing the convex futures contract by applying the actual tick value to a difference between the trade price data and the settlement price; triggering a computer-assisted transfer of the amount of money; and generating, at the printing device, documentation including the computed amount of money transferred, in clearing the trade of the convex futures contract.

Evidence Appendix B

UNITED STATES PATENT AND TRADEMARK OFFICE

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/273,673	03/22/1999	JOHN C. DOYLE	DOYLE-P99-1	7424

7590 08/23/2007	EXAMINER

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ART UNIT	PAPER NUMBER
3692	

MAIL DATE	DELIVERY MODE
08/23/2007	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

RESPONSE DUE:
Oct. 23, 2007

PTOL-90A (Rev. 04/07)

	Application No.	Applicant(s)
Office Action Summary	09/273,673	DOYLE, JOHN C.
	Examiner	**Art Unit**
	Clement B. Graham	3692

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.
- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on <u>*14 June 2007*</u>.

2a)☐ This action is **FINAL**.   2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) <u>*21-40*</u> is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) <u>*21-40*</u> is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

    Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a)☐ All   b)☐ Some * c)☐ None of:

        1.☐ Certified copies of the priority documents have been received.

        2.☐ Certified copies of the priority documents have been received in Application No. _____.

        3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1)☒ Notice of References Cited (PTO-892)

2)☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3)☐ Information Disclosure Statement(s) (PTO/SB/08)
    Paper No(s)/Mail Date _____.

4)☐ Interview Summary (PTO-413)
    Paper No(s)/Mail Date. _____.

5)☐ Notice of Informal Patent Application

6)☐ Other: _____.

U.S. Patent and Trademark Office

PTOL-326 (Rev. 08-06)   Office Action Summary   Part of Paper No./Mail Date 20070813

DETAILED ACTION

1.   A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114. Applicant's submission filed on 6/14/07 has been entered.

2.   Claims 21-40, remained pending.

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patent ability shall not be negatived by the manner in which the invention was made.

4.   Claims 21-40, are rejected under 35 U.S.C. 103(a) as being unpatentable over Wagner U.S Patent 4, 903, 201) in view of Shepherd U.S Patent 5, 970, 479).

As per claim 21, Wagner discloses a system for forward rate agreement futures contract trading, wherein a forward rate agreement futures contract comprises a convex futures contract related to a London Interbank Offered Rate (LIBOR), said system comprising:

an input device receiving or having access to:

1) a settlement price for each of a plurality of forward rate agreement futures contracts listed by an exchange,(see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67)

2) expirations for each of the plurality of forward rate agreement futures contracts,

3) an identification of a seller of each of the plurality of forward rate agreement futures contracts (see column 19 lines 40-67 and column 20 lines 1-67 and column 21 lines 15-67 and column 22 lines 1-26)

4) an identification of a buyer of each of the plurality of forward rate agreement futures contracts(see column 3 lines 4-25)

5) a trade price for each of the plurality of forward rate agreement futures contracts, and

6) a base tick value representing a currency value for a minimum change in a contract price and a processor configured to: (see column 21 lines 63-67)

2) determine an actual tick value for each of the plurality of forward rate agreement futures contracts based on the present value factor for the forward rate agreement futures contract and the base tick value, generate a settlement amount for each of the plurality of forward rate agreement futures contracts using (see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26)

a) a number of contracts net bought or sold by an entity by the end of the previous day,

b) a number of contracts bought or sold by the entity by the end of the current day,

c) a price at which the entity bought or sold during the current day, d) a settlement price for each contract for the previous day, e) a settlement price for each contract for the current day, and f) the actual tick value for the current day for each forward rate agreement futures contract, the settlement amount representing, for each forward rate agreement futures contract, an amount paid by an entity that lost money to the exchange or paid by the exchange to an entity that made money on the current day, and generate payment instructions for at least one of a buyer's bank and a seller's bank based on the settlement amount for each of the plurality of forward rate agreement futures contracts. (see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

Wagner fail to explicitly teach calculate and save a present value factor using the settlement price of a forward rate agreement futures contract of the plurality of forward rate agreement futures contracts whose expiration is closest to the current date on which the present value factor is calculated, the processor calculating and saving a present value factor for each of the remaining plurality of forward rate agreement futures contracts based on the previous present value factor calculation and the settlement price of the forward rate agreement futures contract whose expiration is next closest to the current date on which the present value factor is calculated.

However Shepherd discloses the Contract Bid Price is calculated automatically by the application software in the following manner: The ordering party-specified desired contingent

entitlement amounts, i.e. the "registered data", (covering the feasible product definition value range) are multiplied by the potential counterparty-specified component product prices (which will rarely add to "1" because each counterparty is endeavouring to `game` potential ordering parties in different ways) to yield the corresponding number of implied contingent entitlement amounts. When added together, these figures sum to (34.110), where the brackets signify a negative value. This figure represents an expected futures counterparty-entitlement payout amount (as at the designated contract maturity date of 95.02.10.17.00.00). The present day value of this figure, calculated using the specified discount rate of 9.90% per annum, is 29.220. To this amount is added the potential counterparty's desired flat commission amount of 1.10%, yielding a contract Bid Price (in the consideration/entitlement denomination of the product, commercial bank-denominated Australian dollars) of 29,540. No exchange rates are applicable in this case, because the ordering party, Denisons, is not seeking to deal in a consideration or entitlement denomination different to the denominations formally specified for the product. Demdata's parameters calculate that a consideration bid price of 29,540 will yield them a base margin on the contract of 3,180 (again denominated in commercial bank, Australian dollars).(see column 12 lines 28-67 and column 13 lines 1-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Wagner to include calculate and save a present value factor using the settlement price of a forward rate agreement futures contract of the plurality of forward rate agreement futures contracts whose expiration is closest to the current date on which the present value factor is calculated, the processor calculating and saving a present value factor for each of the remaining plurality of forward rate agreement futures contracts based on the previous present value factor calculation and the settlement price of the forward rate agreement futures contract whose expiration is next closest to the current date on which the present value factor is calculated taught by Shepard in order to manage risk relating to specified yet unknown future events by enabling parties or entities to reduce their exposure to specified risks by constructing compensatory claim contract orders.

As per claim 22, Wagner discloses further comprising an output device generating documentation of a funds transfer and confirmation of trade. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20

lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 23, Wagner discloses wherein the present value factor (PVF) is determined usingPVF = [1 + Ro(Do/360)]x[1 + F1(D1/360)]x ... x [1 + F,,,(D,,/360)]' wherein R0 represents a spot LIBOR for a first futures contract expiration, Do represents a number of days from spot to the first futures contract expiration, Dn represents a number of days from spot to a last listed futures contract, FI represents a forward rate implied by the first futures contract, and F, represents a forward rate implied by the last listed futures contract. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 24, Wagner discloses wherein the actual tick value is determined by multiplying the base tick value by the present value factor. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 25, Wagner discloses wherein the settlement amount for a futures contract buyer is determined using B=(Ps-P~)xATVxlO0, wherein B represents a settlement amount due to or from a buyer for a futures contract, Ps represents the settlement price for the futures contract, Pt represents the trade price for the futures contract, and ATV represents the actual tick value for the futures contract, and wherein the settlement amount for a futures contract seller is determined using S =(Pt-Ps)× ATV × 100, wherein S represents a settlement amount due to or from a seller for a futures contract, Ps represents the settlement price for the futures contract, Pt represents the trade price for the futures contract, and ATV represents the actual tick value for the futures contract. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 26, Wagner discloses a method for convex futures contract trading, the convex futures contract price related to an interest rate, wherein a plurality of convex futures contracts are listed on an exchange and each of the plurality of convex futures contracts has a related settlement price, expiration, and trade price, said method comprising:

determining an actual tick value for each of the plurality of convex futures contracts based on the present value factor for the convex futures contract and a base tick value representing a

currency value for a minimum change in a contract price(see column 19 lines 40-67 and
column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26)
generating a settlement amount for each of the plurality of convex futures contracts using:
a number of contracts net bought or sold by an entity by the end of the previous day,
a number of contracts bought or sold by the entity by the end of the current day,
a price at which the entity bought or sold during the current day, 4) a settlement price for each
contract for the previous day, 5) a settlement price for each contract for the current day, and
the actual tick value for the current day for each convex futures contract, the settlement
amount representing, for each convex futures contract, an amount paid by an entity that lost
money to the exchange or paid by the exchange to an entity that made money on the current
day; and generating payment instructions for at least one of a buyer's bank and a seller's bank
based on the settlement amount for each of the plurality of convex futures contracts. (see
column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22
lines 1-26).

Wagner fail to explicitly teach calculating and saving a first present value factor using the
settlement price of a first convex futures contract of the plurality of convex futures contracts
whose expiration is closest to the current date on which the first present value factor is
calculated, calculating and saving a present value factor for each of the remaining plurality of
convex futures contracts based on the previous present value factor calculation and the
settlement price of the convex futures contract whose expiration is next closest to the current
date on which the present value factor is calculated.

However Shepherd discloses the Contract Bid Price is calculated automatically by the
application software in the following manner: The ordering party-specified desired contingent
entitlement amounts, i.e. the "registered data", (covering the feasible product definition value
range) are multiplied by the potential counterparty-specified component product prices (which
will rarely add to "1" because each counterparty is endeavouring to `game` potential ordering
parties in different ways) to yield the corresponding number of implied contingent entitlement
amounts. When added together, these figures sum to (34.110), where the brackets signify a
negative value. This figure represents an expected futures counterparty-entitlement payout
amount (as at the designated contract maturity date of 95.02.10.17.00.00). The present day

value of this figure, calculated using the specified discount rate of 9.90% per annum, is 29.220. To this amount is added the potential counterparty's desired flat commission amount of 1.10%, yielding a contract Bid Price (in the consideration/entitlement denomination of the product, commercial bank-denominated Australian dollars) of 29,540. No exchange rates are applicable in this case, because the ordering party, Denisons, is not seeking to deal in a consideration or entitlement denomination different to the denominations formally specified for the product. Demdata's parameters calculate that a consideration bid price of 29,540 will yield them a base margin on the contract of 3,180 (again denominated in commercial bank, Australian dollars).(see column 12 lines 28-67 and column 13 lines 1-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Wagner to include calculating and saving a first present value factor using the settlement price of a first convex futures contract of the plurality of convex futures contracts whose expiration is closest to the current date on which the first present value factor is calculated, calculating and saving a present value factor for each of the remaining plurality of convex futures contracts based on the previous present value factor calculation and the settlement price of the convex futures contract whose expiration is next closest to the current date on which the present value factor is calculated taught by Shepard in order to manage risk relating to specified yet unknown future events by enabling parties or entities to reduce their exposure to specified risks by constructing compensatory claim contract orders.

As per claim 27, Wagner discloses further comprising generating documentation of a funds transfer and confirmation of trade. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21 lines 15-67 and column 22 lines 1-26).

As per claim 28, Wagner discloses wherein the present value factor (PVF) is determined using $PVF = [1 + Ro(Do/360)] \times [1 + Fl (D1/360)] \times ...x [1 + Fn (D,,/360)]$ ' wherein R0 represents a spot LIBOR for a first futures contract expiration, Do represents a number of days from spot to the first futures contract expiration, Dn represents a number of days from spot to a last listed futures contract, F1 represents a forward rate implied by the first futures contract, and F, represents a forward rate implied by the last listed futures contract.

(see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 29, Wagner discloses wherein the actual tick value is determined by multiplying the base tick value by the present value factor. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 30, Wagner discloses wherein the settlement amount for a futures contract buyer is determined using $B = (Ps - Pt) \times ATV \times 100$, wherein B represents a settlement amount due to or from a buyer for a futures contract, Ps represents the settlement price for the futures contract, Pt represents the trade price for the futures contract, and ATV represents the actual tick value for the futures contract, and wherein the settlement amount for a futures contract seller is determined using $S = (Pt - Ps) \times ATV \times 100$, wherein S represents a settlement amount due to or from a seller for a futures contract, Ps represents the settlement price for the futures contract, Pt represents the trade price for the futures contract, and ATV represents the actual tick value for the futures contract. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 31, Wagner discloses further comprising:
generating a cumulative price quote for a group including a plurality of convex futures contract; and displaying the cumulative price quote on the display device to convey information for use in trading the group. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 32, Wagner discloses further comprising: generating a price for a floor option on a convex futures contract; and
displaying the price for the floor option on the display device to convey information for use in trading the floor option. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 33, Wagner discloses wherein the step of generating a price includes accounting for a limit, the limit from the group consisting of a cap, a floor, or both, in generating the price. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 34, Wagner discloses further comprising using data representing a convex futures contract in computing a price for an Over-The-Counter option. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 35, Wagner discloses wherein the forming an interest rate swap including the convex futures contract includes computing interest payments for the interest rate swap.

As per claim 36, Wagner discloses further comprising computing a zero coupon libor curve in real time and applying the zero coupon libor curve to a portfolio of interest rate derivatives to create forward rates, expected cash flows, and present value of the case flows for risk management manipulation of the portfolio. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 37, Wagner discloses further comprising calculating an exposure indicia of movement in the curve. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 38, Wagner discloses further comprising publishing daily quotes of the present value factors for each of the plurality of convex futures contracts to provide information for use in trading the convex futures contracts. (see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 39, Wagner discloses further comprising conveying present value factor data to a plurality of vendor or broker computers on the exchange for use in trading one or more of the plurality of convex futures contracts. (see column 20 lines 54-67 and column 3

lines 4-25 and column 7 lines 12-67 and see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

As per claim 40, Wagner discloses a method for clearing convex futures contracts traded on an exchange by one or more trading firms, a price of the convex futures contracts related to an interest rate, said method comprising:

notifying the trading firm of a trade confirmation for the convex futures contract, the trade price for the convex futures contract, the discount factor for the convex futures contract, open positions for the convex futures contract, and the settlement amount due to or from the trading firm,(see column 20 lines 54-67 and column 3 lines 4-25 and column 7 lines 12-67)

and triggering a computer-assisted transfer of funds to or from an account associated with the trading firm. (see column 19 lines 40-67 and column 20 lines 1-67 and column 21lines 15-67 and column 22 lines 1-26).

Wagner fail to explicitly teach multiplying a trade price for a convex futures contract by a discount factor for an appropriate date to determine a settlement amount due by or to a trading firm, the discount factor modifying the trade price based on a base tick value adjusted by a representative closing price of last trading for the convex futures contract for the appropriate date.

However Shepherd discloses the Contract Bid Price is calculated automatically by the application software in the following manner: The ordering party-specified desired contingent entitlement amounts, i.e. the "registered data", (covering the feasible product definition value range) are multiplied by the potential counterparty-specified component product prices (which will rarely add to "1" because each counterparty is endeavouring to `game` potential ordering parties in different ways) to yield the corresponding number of implied contingent entitlement amounts. When added together, these figures sum to (34.110), where the brackets signify a negative value. This figure represents an expected futures counterparty-entitlement payout amount (as at the designated contract maturity date of 95.02.10.17.00.00). The present day value of this figure, calculated using the specified discount rate of 9.90% per annum, is 29.220. To this amount is added the potential counterparty's desired flat commission amount of 1.10%, yielding a contract Bid Price (in the consideration/entitlement denomination of the product, commercial bank-denominated Australian dollars) of 29,540. No exchange rates are applicable

in this case, because the ordering party, Denisons, is not seeking to deal in a consideration or entitlement denomination different to the denominations formally specified for the product. Demdata's parameters calculate that a consideration bid price of 29,540 will yield them a base margin on the contract of 3,180 (again denominated in commercial bank, Australian dollars).(see column 12 lines 28-67 and column 13 lines 1-17).

Therefore it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the teachings of Wagner to include multiplying a trade price for a convex futures contract by a discount factor for an appropriate date to determine a settlement amount due by or to a trading firm, the discount factor modifying the trade price based on a base tick value adjusted by a representative closing price of last trading for the convex futures contract for the appropriate date taught by Shepard in order to manage risk relating to specified yet unknown future events by enabling parties or entities to reduce their exposure to specified risks by constructing compensatory claim contract orders.

Conclusion

Response to Arguments

5.   Applicant 's arguments filed on 06/14/2007 has been fully considered but they are moot in view of new grounds of rejections.

6.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Clement B Graham whose telephone number is 571-272-6795. The examiner can normally be reached on 7am to 5pm.

7.   Applicant's claim 1, states " configured to"
However the subject matter of a properly construed claim is defined by the terms that limit its scope. It is this subject matter that must be examined. As a general matter, the grammar and intended meaning of terms used in a claim will dictate whether the language limits the claim scope. Language that suggests or makes optional but does not require steps to be performed or does not limit a claim to a particular structure does not limit the scope of a claim or claim limitation. The following are examples of language that may raise a question as to the limiting effect of the language in a claim:

(A)   statements of intended use or field of use,

(B)   "adapted to" or "adapted for" clauses,

(C)   "wherein" clauses, or

(D)   "whereby" clauses.

This list of examples is not intended to be exhaustive. See also MPEP § 2111.04.

**>USPTO personnel are to give claims their broadest reasonable interpretation in light of the supporting disclosure. In re Morris, 127 F.3d 1048, 1054-55, 44 USPQ2d 1023, 1027-28 (Fed. Cir. 1997). Limitations appearing in the specification but not recited in the claim should not be read into the claim. E-Pass Techs., Inc. v. 3Com Corp., 343 F.3d 1364, 1369, 67 USPQ2d 1947, 1950 (Fed. Cir. 2003) (claims must be interpreted "in view of the specification" without importing limitations from the specification into the claims unnecessarily). In re Prater, 415 F.2d 1393, 1404-05, 162 USPQ 541, 550-551 (CCPA 1969). See also In re Zletz, 893 F.2d 319, 321-22, 13 USPQ2d 1320, 1322 (Fed. Cir. 1989) ("During patent examination the pending claims must be interpreted as broadly as their terms reasonably allow.... The reason is simply that during patent prosecution when claims can be amended, ambiguities should be recognized, scope and breadth of language explored, and clarification imposed.... An essential purpose of patent examination is to fashion claims that are precise, clear, correct, and unambiguous. Only in this way can uncertainties of claim scope be removed, as much as possible, during the administrative process.").<

Where an explicit definition is provided by the applicant for a term, that definition will control interpretation of the term as it is used in the claim. Toro Co. v. White Consolidated Industries Inc., 199 F.3d 1295, 1301, 53 USPQ2d 1065, 1069 (Fed. Cir. 1999) (meaning of words used in a claim is not construed in a "lexicographic vacuum, but in the context of the specification and drawings."). Any special meaning assigned to a term "must be sufficiently clear in the specification that any departure from common usage would be so understood by a person of experience in the field of the invention." Multiform Desiccants Inc. v. Medzam Ltd., 133 F.3d 1473, 1477, 45 USPQ2d 1429, 1432 (Fed. Cir. 1998). See also MPEP § 2111.01.

8.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Clement B Graham whose telephone number is 703-305-1874. The examiner can normally be reached on 7am to 5pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's
supervisor, Hyung S. Sough can be reached on 703-308-0505. The fax phone numbers
for the organization where this application or proceeding is assigned are 703-305-0040
for regular communications and 703-305-0040 for After Final communications.
Any inquiry of a general nature or relating to the status of this application or proceeding
should be directed to the receptionist whose telephone number is 703-305-3900.

CG

Aug 8, 2007

FRANTZY POINVIL
PRIMARY EXAMINER
AU 3692

		Application/Control No.	Applicant(s)/Patent Under Reexamination
Notice of References Cited		09/273,673	DOYLE, JOHN C.
		Examiner	Art Unit	
		Clement B. Graham	3692	Page 1 of 1

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Name	Classification
*	A	US-5,970,479	10-1999	Shepherd, Ian K.	705/37
	B	US-			
	C	US-			
	D	US-			
	E	US-			
	F	US-			
	G	US-			
	H	US-			
	I	US-			
	J	US-			
	K	US-			
	L	US-			
	M	US-			

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*		Document Number Country Code-Number-Kind Code	Date MM-YYYY	Country	Name	Classification
	N					
	O					
	P					
	Q					
	R					
	S					
	T					

NON-PATENT DOCUMENTS

*		Include as applicable: Author, Title Date, Publisher, Edition or Volume, Pertinent Pages)
	U	
	V	
	W	
	X	

*A copy of this reference is not being furnished with this Office action. (See MPEP § 707.05(a).)
Dates in MM-YYYY format are publication dates. Classifications may be US or foreign.

Evidence Appendix C

[54] **AUTOMATED FUTURES TRADING EXCHANGE**

[75] Inventor: Susan W. Wagner, Dallas, Tex.

[73] Assignee: World Energy Exchange Corporation, Dallas, Tex.

[21] Appl. No.: 548,319

[22] Filed: Nov. 3, 1983

[51] Int. Cl.⁴ G06F 15/30
[52] U.S. Cl. 364/408; 364/918.8; 364/900
[58] Field of Search 364/200, 900, 300, 408; 340/825.26; 235/375

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Primary Examiner—Jerry Smith
Assistant Examiner—Jon D. Grossman
Attorney, Agent, or Firm—Sigalos, Levine & Montgomery

[57] **ABSTRACT**

A computerized open outcry exchange system for transacting sales of a particular futures commodity contract by members of a futures trading exchange wherein bids to purchase or offers to sell the particular commodity contract are made by the members through remote terminals and the exchange computer automatically matches offers and bids to complete the transaction.

42 Claims, No Drawings

FIG. 1

10

REMOTE TERMINAL — 18

22

TRADING TERMINAL AND DISPLAY

30

28
PRINTER

26

34

24
STORAGE ON-LINE

MODEM — 32

— 36

11

CENTRAL TRADE EXCHANGE

MODEM — 14

42

LIVE SURVEILLANCE SYSTEM

51

53

— 12

TRADING SYSTEM

CENTRAL PROCESSOR
13

- VALIDATION OF TERMINAL INPUT
- QUEUES ORDERS BY TIME, SIZE AND COMMODITY CONTRACT
- EXECUTES MATCHING BIDS & OFFERS & CLEARS TRADES SIMULTANEOUSLY
- REPORTS LAST SALE BY TIME, QUANTITY & PRICE BY COMMODITY
- REPORTS BIDS / OFFERS AS RECEIVED
- NOTIFIES TRADER OF FILLED / UNFILLED ORDERS
- REPORTS VARIOUS MARKET CONDITIONS / TRANSACTIONS
- MAINTAINS DETAILED TRADE HISTORY
- PROVIDES NECESSARY TRADE DATA FOR SETTLEMENT & COMPLIANCE
- SHOWS DIFFERENTIAL INFORMATION BY TYPE OF COMMODITY AND AND COMMODITY MONTH
- PROVIDES DISPLAYS FOR SIMULTANEOUSLY EXECUTING "SPREAD" TRADES
- PROVIDES REAL TIME SURVEILLANCE TO DETECT TRADING IRREGULARITIES

38

40

CLEARING SYSTEM

46

MODEM — 16

44

COMPLIANCE SYSTEM

48

50

INQUIRY / CONTROL TERMINAL

42

32
MODEM

34

24
STORAGE ON-LINE

26

TRADING TERMINAL AND DISPLAY

30

20

28

PRINTER

FIG. 2

TRADING SYSTEM 12

- TRADE DATA
  - TRADER/CLEARING MEMBER
  - COMMODITY ACTIVITY
  - TRADE MATCHING
- NEWS AND STATISTICS
- INTERIM POSITION REPORTS BY PERSONAL IDENTIFICATION NUMBER
- MARKET SURVEILLANCE
- COMMUNICATIONS/DELIVERY PRICE REPORTING
- AFTER HOURS ENTRIES
  - TRANSFERS
  - CORRECTIONS
- POSITION LIMIT CONTROL
- SECURITY

CLEARING SYSTEM 38

- POSITIONS BY CLEARING MEMBERS
- MARGINS REQUIREMENTS
  - ORIGINAL
  - VARIATION
  - OTHER
- DELIVERY NOTICE ALLOCATION AND TRACKING
  - MARGIN
  - RELEASE
- CLEARING REPORTS
  - ELECTRONIC HARDCOPY
- ADMINISTRATION
  - POSITION REPORTS
  - TRANSFERS
  - ACCOUNTING
  - INVESTING
- DELIVERY
- CASH/PHYSICALS VERIFICATION

COMPLIANCE 44

- TIME SORTED TRADE ACTIVITY
- TRADER/MEMBER REPORTS
- HISTORY
- SPECIAL PROGRAMS
- CROSS TRADES
  - TRANSFERS OF POSITIONS
  - TRADING IRREGULARITIES
- EARLY WARNING
- MEMBER FINANCIAL POSITIONS
- ANALYSIS OF RISK
- AUDIT CHECKLIST

FIG. 3

HOST — 10

36

MODEM — 32

34

PROCESSOR WITH MEMORY — 112

116

ADDITIONAL MEMORY — 114

108 — KEYBOARD ENTRY — 106

110

PRINTER OUTPUT — 28

VIDEO DISPLAY — 118

120

REMOTE TERMINAL (HARDWARE CONFIGURATION)

18

FIG. 4

18

REMOTE TERMINAL (OUTBOUND ORDER PROCESS)

108 — KEYED INPUT — 106

110

ORDER MESSAGE — 122

126

TERMINAL I.D. — 124

- PRICE
- QUANTITY
- BUY / SELL
- COMMODITY CONTRACT
- ACCOUNT TYPE (PERSONAL, ETC.)

128

HOST — 13

12

PENDING FILE (OPEN ORDERS) — 130

DISPLAY — 132

134

PRINT

FIG. 5
ORDER
MESSAGE
(INBOUND)

ONE
ORDER
136

138

144

13 HOST

142
140

OTHER
ORDERS

COMPARATOR
(CAN ORDER
BE EXECUTED)

YES 154

NO 146

148
COMMODITY
PRICE
FILE
(BIDS /
OFFERS)

ARRANGED
IN ORDER BY:
• TIME
• PRICE
• QUANTITY

156
PENDING
FILE

158 EXECUTED

160
CONFIRMATION
OF
EXECUTION

162

163
CONFIRMATION
OF ORDER
RECEIPT /
EXECUTION

161

164
DISPLAY
FILLED /
UNFILLED
ORDERS

152

150
DISPLAY
BY
COMMODITY

FIG. 6

ORDER
ACK. OR
EXECUTION
13

• ORDER
• CANCELLATION
• EXECUTION
• MODIFICATION

144

153 EXECUTION

COMPARATOR
(ORDER OR
EXECUTION)

ORDER

COMPARATOR
(ORDER)
166

167

155
COMPARATOR
(NEW HIGH OR
NEW LOW PRICE)

157

159
UPDATE
MEMORY-HIGH
OR LOW-
AND COMMODITY
FILE

168

COMPARATOR
(BID OR
OFFER)

OFFER

170

BID 174

176

UPDATE
MEMORY
PRICE FIELD
AND QUANTITY

163

165

RECORD IN
BID QUEUE
BY TIME,
PRICE & QTY.

172

RECORD IN
OFFER QUEUE
BY TIME,
PRICE & QTY.

FIG. 7

178 → TERMINAL INPUT 180

182

COMPARATOR (VERIFY TERMINAL AND INPUT) 184

186 VALID TRADER AND FILE

188

NO → RETURN TO SOURCE 190

192 YES

IDENTIFY TRANSACTION TYPE 194

NEW ORDER 210

204

ADMIN. INQUIRY 196

ORDER TRADE PROCESS 212

MORNING WAKE-UP OR RETRANSMIT PROCESS 206

208 200

202 TO REMOTE TERMINAL

RETRIEVAL OF FILES 198

214

TIME STAMP TRANSACTION 216

218

ORDER HISTORY FILE 220

222

COMPARATOR (BUY OR SELL) 224

SELL 226

BUY

228

ORDER TYPE 230

232

COMPARATOR (IMMEDIATE ORDER) FIG. 8 234

238

COMPARATOR (CONDITIONAL ORDER) FIG. 9 236

FIG. 8

FROM
FIG. 7   232

MARKET ORDER   MODIFICATION   CANCELLATION

240   242   244
OPEN   OPEN   OPEN
ORDER   ORDER   ORDER
QUEUE   QUEUE   QUEUE

322
FROM   246   290   292   308   310
FIG. 9   250

248 COMPARATOR   NO   COMPARATOR   NO   COMPARATOR   NO
     (MATCH WITH   (MATCH WITH   (MATCH WITH
     OPEN ORDER)   OPEN ORDER)   OPEN ORDER)

252   YES   296   YES   YES
                          294   312   314

254 TIME STAMP
     TRANSACTION

256   298
262   260   258
                                TIME STAMP
                                MODIFICATION   FROM
                                                      FIG. 9
MASTER   RECORD   324
TRADE   TRADE DATA   302   300
FILE

                         DELETE OLD
                         TRADE DATA
                         ADD NEW DATA

304   306
264

EXECUTION   ORDER

278   276   274
                              266
PRICE   MATCHED   ORDER
REPORTING   TRADE   CONFIRMATION
SYSTEM   INFORMATION
                                       268
280   284   270
                                       TRANSMIT
282   TO BUYER
            TRANSMIT   AND SELLER
PRICE   LAST SALES   286
QUOTATION   TO BUYER   272
(VENDORS)   AND SELLER

            288

TO REMOTE   TO REMOTE
TERMINAL   TERMINAL

FIG. 9

FROM
FIG. 7

232

FILL
OR
KILL

OPEN ORDER
QUEUE   316

318   320

COMPARATOR
(CONDITIONS
SATISFIED)   NO   324

YES

322

TO
FIG. 8

334

OPEN ORDER
QUEUE

336

TO
FIG. 8

340

TIME
STAMP   338

MASTER
TRADE
FILE   330

342   346

NO

COMPARATOR
(CONDITIONS
SATISFIED)

344   YES

348

EXECUTION   ORDERS

276

MATCHED
TRADE
INFO   274

ORDER
CONFIRMATION   266

278   284

PRICE
REPORTING
SYSTEM

280

TRANSMIT
LAST SALES
TO BUYER
AND SELLER   286

268

TRANSMIT
TO BUYER
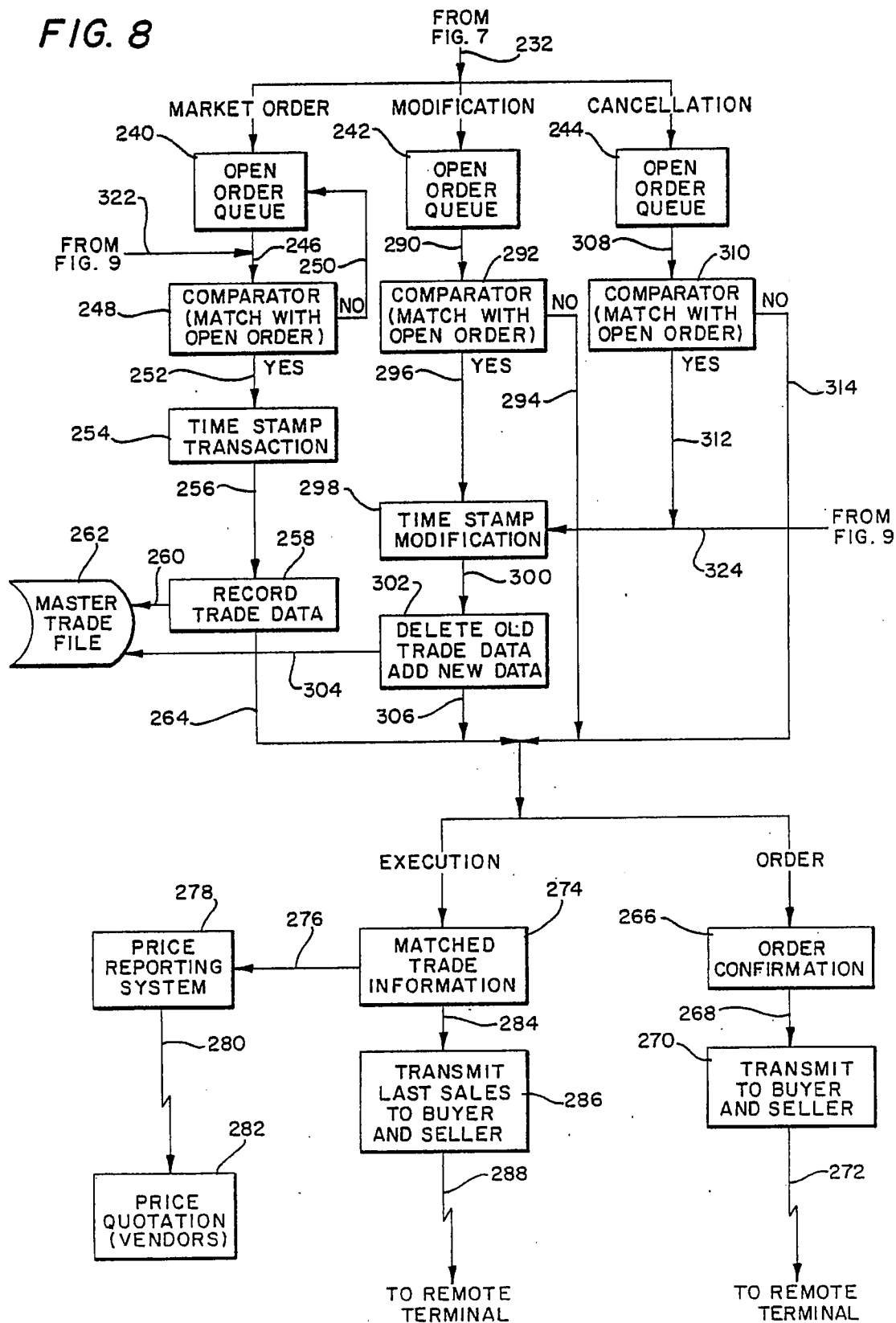AND SELLER   270

282

PRICE
QUOTATION
(VENDORS)

288

TO REMOTE
TERMINAL

272

TO REMOTE
TERMINAL

FIG. 10
REMOTE
TERMINAL

FIG. 11
CENTRAL
EXCHANGE
SYSTEM

FROM FIG. 10 — 400

RECEIVE AND TIME STAMP ORDER — 402, 406

VALID ORDER AND TERMINAL? — 408

410

WHY IS ORDER INVALID? — 412

COMMODITY/PRICE — 434

TERMINAL — 414

COMMODITY/PRICE ERROR — 436

TERMINAL ERROR — 416

438

SEND TO REMOTE TERMINAL — 426

418

440 — YES

MARKET OR COND. ORDER? — 442

CONDITIONAL — 444

452 — MARKET

428

420

PRINT

422

CAN MATCH OCCUR? — 454

460

NO — 456

RESUBMIT — 458

FIG. 13 — 446

448

454

CONFIRM AUTH. — 424

462 — YES

MATCH BUY/SELL ORDERS TIME STAMP — 450

PRICE REPORT (FIG. 15) — 452

457

TOTAL QUANTITY SATISFIED? — 459

NO — 461

463 — YES

PREPARE CONFIRM. MESSAGE FOR BUYER AND SELLER — 464

466

428

CREATE MASTER TRADE RECORD — 470

MASTER TRADE FILE HOST

472

MASTER TRADE FILE — 474

468

SEND CONFIRM. — 430

432

TO FIG. 12

38

CLEARING SYSTEM

44

COMPLIANCE SYSTEM

51

SURVEILLANCE SYSTEM

FIG. 12
REMOTE
TERMINAL

FROM
FIG. 11
432

478
480

RECEIVE
CONFIRM.
MESSAGE — 476

PRINT
CONFIRM.
MESSAGE

482

DELETE
FROM
PENDING
FILE — 484

486

PENDING
ORDER
FILE — 488

490

TRADE
OR ORDER
? — 492

494

TRADE
CONFIRM. — 496

498

UPDATE
ORDER
QUEUE
AND
DISPLAY

FILE
ORDER — 500

502

506

FILLED
ORDER
FILE
SCREEN

510

508

DISPLAY

MY
ORDER
?

NO

YES

512

PRINTED
COPY

END

FIG. 13
ORDER QUEUE-HOST

FROM FIG. 11

444 ⎰⎱ 461

PRIORITIZE
ORDER BY
TIME, PRICE
AND QUANTITY — 530

532

534

561

536

428

TO
FIG. 11

AUTOMATIC
UPDATE
FILE (FIG. 14)

APPEND
CONDITION
CODE TO
ORDER — 538

540

548

SCAN OPEN
ORDER FILE
FOR MATCH

542

448

552

TO
FIG. 11

DELETE
ORDERS
FROM OPEN
ORDER FILE

546   544

YES

CAN
MATCH
OCCUR
?

NO

550

FIG. 14
AUTOMATIC
UPDATING
PROCESS-HOST

FROM FIG. 13

532

554

556

ORDER

ORDER
OR TRADE
?

TRADE

570

558

572

ASSIGN ORDER
UPDATE NO.
AND ADDRESS
FOR ALL
TERMINALS

574

560

ORDER
UPDATE
NUMBER
FILE

ASSIGN TRADE
UPDATE NO.
AND CROSS
REFERENCE

TO
FIG. 13

576

578

561

562

PREPARE
MESSAGE
FOR
DISTRIBUTION

TO
FIG. 13

PREPARE
MESSAGE
FOR
DISTRIBUTION — 564

580

582

566

568

SEND ORDER
UPDATE TO
TRADER
TERMINALS

428

TO
FIG. 11

SEND TRADE
UPDATE TO
TRADE
TERMINALS

FIG. 15
PRICE
REPORTING
PROCESS

FROM
FIG. II 452

CREATE
OUTPUT
MESSAGE FOR
COMMODITY,
QUANTITY
AND PRICE 584

TERMINAL
INQUIRY 585

586

SEND PRICE
REPORT TO
PUBLIC QUOTE
VENDORS 588

590

592 592 592

VENDOR VENDOR VENDOR VENDOR VENDOR

FIG. 16

594 12

BACK-UP FILE
(DUPLICATE) 598

MASTER
TRADE
RECORD
FILE 596

COMPLIANCE
SYSTEM 44

600

GROSS
POSITION
REPORT 606

CLEARANCE
AND
POSITION
MODULE 602

POSITION
LIMITS 604

NET 608

CONTROL
TERMINAL 50

OFFSET 610 614

616

MARGIN
PROCESSING
MODULE 612

618

BANKING
RECONCILIATION 622

FINANCIAL
AND
REPORT MODULE 620

CLEARING
REPORTS 624

• MEMBERS
• EXCHANGE
• CLEARING
  CORPORATION

38

FIG. 17

FIG. 19

FIG. 18

AUTOMATED FUTURES TRADING EXCHANGE

FIELD OF THE INVENTION

The present invention relates to a futures trading exchange and in particular to an automated open outcry futures trading exchange having a central processor associated with one or more remote terminals through which trades can be made by members of the exchange who enter offers or bids at the remote terminal and couple them to a central processor which compares any bid with offers on a priority basis, finds a match and completes the execution of the transaction.

The major purpose of the futures marketplace is to provide a facility whereby large numbers of people can make bids and offers through a central location on a commodity contract in order to determine its market value. A second purpose of the futures market is to spread the risk of price changes in a business from a small group of people to a larger group of people. This process is known as risk management. The reason the risk can be spread is that speculators, in addition to hedgers, enter the market and provide liquidity when they recognize an economic benefit from changes in the prices of commodity contracts. The larger number of participants allows a hedger to identify a price level which takes into account his cost of doing business and his desired profit level and then to lock-in a price level by offsetting losses in the cash market with equal gains in the futures market. All of this must be done in such a way as to minimize fraud and manipulation of the marketplace and is conducted with the oversight of and under the direction of the federal government which establishes the required rules and regulations.

BACKGROUND OF THE INVENTION

The method or process of trading futures contracts has remained virtually the same since the markets first opened in the 1800's. Use of state of the art technology in present systems has been limited thus resulting in major inefficiencies and opportunities for abuse. The futures trading system and markets, as they exist today, are the remnants of an archaic system. When an investor (hedger or speculator) wishes to trade on any of the futures exchanges, he is many times removed from access to firsthand trade data unless he is a floor trader. He must first call his broker who may have a direct line to a floor clerk but, generally, must call the trading room of the broker headquarters. The trading room calls the floor clerk who in turn relays the information to a runner. The runner relays the request for information or execution of a trade to the floor trader. The floor trader stands in a "pit" and executes a trade by shouting out his offer to sell, or buy, until someone across the pit signals that they will take the offered price (bid). When a trader thinks he has made a trade, he marks a trading card and a portion of the card is given to the exchange to begin the clearing process or accounting and funds collection process. This is known as the "open outcry" system because trading takes place in a central location in open view of a variety of participants. Most exchanges require that the trader enter the trade within one-half hour of the time a trade has been executed.

As can be imagined, there are many problems with the present archaic system. The markets were originally designed when there were a relatively few number of people who wished to participate in the process. As the number of participants have increased, it has meant that those who are directly on the floor of an exchange are at a distinct advantage over those who are not physically present. First, when a customer asks a question as to what is taking place, the question is relayed through four or five people. An answer to a question is at most subjective because it is based on the observation of those who are on the floor. The floor trader will tell what he thinks is happening but he does not have the tools to be sure that his observation is correct. The advantage that a floor trader has is that if his observation is not correct, he can make an additional trade to correct the situation for himself. But a retail broker or customer may not be advised of a change and at worst may simply be given inaccurate information.

The opportunity for mistake or abuse has been acknowledged by regulators and exchanges alike. As the system presently exists, trades are not confirmed until after an exchange is closed for the day. Therefore, if a floor trader has traded in front of a customer in order to obtain a better price or has failed to execute a trade for fraudulent reasons, it is difficult to detect. Even when a trade has been properly executed the opportunity for abuse or mistakes is still high as will be discussed hereinafter.

On a traditional exchange, after a trade is made a card is handed to an exchange employee who then keypunches the data into the computer. At the same time trading cards must be manually sorted to match trades. At the end of the day the computer lists are checked against the trading cards to reach agreement as to the trades which have been made. As can be well understood, there, first, may have been a mistake in the keypunching process. Secondly, there may be a difference given in the two cards as to the price at which a trade was made and thirdly because the trades are based on eye contact, there may be a difference in opinion as to whether a trade was actually made at all. When there is disagreement, a list of "out trades" is made and agreement must be reached as to whether the trade was made at all and if so at what price. The nature of the discrepancy determines whether the trader, the broker, or the customer must bear the cost of an out trade. Again, because the customer is at a lengthy distance, he is at a disadvantage because he takes no part in the resolution process.

The accounting process also has its problems. Once the matching of trades takes place, the information is fed into the clearing process of an exchange. The present clearing process in most exchanges is a computerized process. However, since information is manually entered, after the fact of the trade, its value lies only in the accounting process and not in the control of the exchange process. The exchange only knows at the end of the day if a trader has exceeded his position limits or has incorrectly identified a clearing member or has provided other incorrect information. On most exchanges 300 to 400 individuals are required to process trading cards and complete the clearing function.

The surveillance of the system as it now exists (to insure proper operation and minimize mistakes and abuse) also has numerous problems. Surveillance is completed on existing exchanges through live observation. An exchange employee stands in the middle of a ring and observes trading as it takes place. With close to a 1,000 people on the floor of an exchange, observation is spotty at best. Some exchanges have programs for detecting illegal trade practices which are repetitive but

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even when such practices are detected often the information available as evidence is inaccurate and unreliable.

The present invention, the automated futures trade exchange, has created an entire automated process for trading futures contracts which provides accurate and precise information, trading based on factual data, assurance of execution and immediate confirmation of the contracts, control through real time processing of information and electronic surveillance, and the use of computer hardware to implement the process. It does not separate clearing and surveillance from the futures trading process as do other exchanges because it is the combined process which allows the markets to function properly.

All trading conducted on the automated futures trading system will be effected through a central computer complex programmed to handle orders for the exchange's futures contracts. Access to this central computer will be available only through specially programmed remote computer terminals which will be distributed only to exchange members who will have a coded membership number. Each remote terminal will consist of a keyboard, a printer, on-line storage and a video monitor, the latter displaying a variety of information regarding the futures contracts traded on the exchange. Members will be able to utilize these terminals to transmit to the central computer bids and offers for their own accounts as principals or for the accounts of customers for whom they are agents. However, the system does not allow direct negotiations between members of the exchange as in the system disclosed in U.S. Pat. No. 3,573,747. Instead, the system acts as an intermediary among members and matches bids and offers and completes the transaction. Thus, the present novel system is an open outcry system since trading takes place in a central location in open view of a variety of participants.

When an order is transmitted to the central computer, its pertinent characteristics will be recorded including quantity, price, the time that the order was placed, and the capacity in which the order is entered; that is, whether as agent or principal. The exchange central computer will retain all orders received, arranging each bid and offer on the basis of its price, quantity and entry time and displaying all bids in descending order of price and all offers in ascending order of price. Thus, each bid or offer will become part of the market data displayed in every member's remote terminal video monitor. The breadth of the market will also be indicated. That is, whether a bid of 200 contracts represents one offer to buy 200 contracts or 20 offers to buy 10 contracts.

In addition, the video monitor of each remote terminal will display lot sizes, last sale prices, daily price ranges, the volume for each contract month, the spread relationships or price differential among the various contract months, and allows simultaneous spread trades (both in time and by commodity) to take place.

Pertinent to this process is the capability to modify prices at a remote terminal by moving a cursor on the video display to the bid or offer desired to be modified by the user which modification is then accomplished through the keyboard. The capability to see the display of buys and sells is analogous to the open outcry system of trading and is pertinent to good trading because it shows the supply and demand in the market. On the floor of an existing exchange, a trader would have a "feel" for the market but would not be able to relay to

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a customer with any degree of accuracy information pertaining to the distribution of bids and offers.

The exchange central computer will automatically match equal bids and offers on a first come, first served basis thereby executing the transaction. Each transaction execution will be immediately confirmed to the members on both sides of the trade by the printing mechanisms of those members terminals. Each execution report will include information regarding the date, time, quantity and price of the transaction. The exchange central computer will be able to handle a full array of futures orders including straddles, limit orders and stop orders. Because bids and offers are transmitted from the remote terminals directly into the computer there will be no chance for an "out trade", that case where a trade is made but the bid and offer do not match. Moreover, because trading will be effected solely by the computer, a record will exist of the precise time each order was entered, the precise time it was executed and the precise time an execution report was transmitted.

Another important factor in trading is the capability to determine the liquidity of the market. Again, on the floor of an exchange a trader may note that trading is active but by the time information is relayed back and forth between the principal and the trader the price may have moved considerably or the bids and offers may no longer be present. No presently existing exchange can determine with accuracy during the trading the volume of trading immediately taking place. The present system will record trades exactly as they are made, when they are made, and thus a member would be able to determine the volume of trading taking place at any particular time and would have the information necessary to determine whether it is likely that he can come in and out of the market at his desired price level.

Each terminal on the system will be specifically designated to trade a certain number of contracts. Position limits for each principal are thus determined by the fiduciary capabilities of the participant. Under the present system of trading on exchanges, a member may execute trades far in excess of his limit without detection by the exchange. In the present trading system, limits will be programmed into each individual terminal thus further eliminating the possibility of "out trades" because an individual trader has exceeded his limits. During trading times live surveillance of the market will take place through control terminals at the exchange. Information may be fed directly into the surveillance system to detect the patterns of trading which may be manipulative and since all information is recorded as trading takes place, accuracy is assured.

All information from the trading system will be moved directly to the clearing system. Thus, there is no manual matching of trades and accuracy of the data is assured. Earlier and more rapid transfer of funds will be possible thus increasing the financial viability of the exchange as a whole.

It has been recognized for some time in the futures industry that multiple factors determine the pricing of commodities. Thus, the use of computerized analysis has rapidly developed and multiple tools for graphing and receiving information has been developed. But the process for trading and processing trades remains archaic. The present system provides a means of executing trades, validating the information, and notifying parties of pertinent changes without bias to those who

participate. Thus, a larger more efficient marketplace may be accommodated at lower cost.

SUMMARY OF THE PRESENT INVENTION

The present invention relates to a computerized open outcry trading exchange system for transacting sales of futures commodity contracts in varying volumes or lot sizes by members of the trading system as principals or agents for others wherein bids to purchase or offers to sell a particular commodity are made by said principals or agents through remote terminals, said system comprising a trading system for receiving buyer bids and seller offers on a particular commodity contract from said remote terminals and automatically completing a transaction of matching bids and offers, a clearing system for establishing requirements and regulations to be observed on said buy and sell transactions, means coupling said clearing system to said trading system for determining the validity of each transaction by comparing said transaction to said requirements and regulations, a compliance system for establishing predetermined criteria necessary to detect illegal trade practices or trade patterns which would adversely affect said commodity market and means coupling said compliance system to said trading system and said clearance system for automatically comparing said transaction to said predetermined criteria thereby enabling detection of illegal trade practices and trade patterns which would adversely affect said commodity market.

The invention also relates to a method for automated futures trading in which the transaction of a sale of a particular futures commodity in varying volumes or lot sizes by members of a futures trading exchange as principals or agents for others wherein bids to purchase or offers to sell are made by said principals or agents for said particular commodity, said method comprising the steps of establishing a trading system for receiving at a central processor buyer bids and seller offers on a particular commodity from remote terminals, storing in said central processor said trade orders in the form of time, price and quantity of each of said received bids and offers, comparing said received bids and offers and matching equal bids and offers on a first come, first served basis according to the time of receiving said bids and offers, forming a clearing system for establishing buy and sell constraints on each member of said exchange, coupling said clearing system to said trading system for approving execution of a transaction only when said transaction falls within said predetermined constraints, executing the buy and sell transaction of said commodity having its offer and bid matched and approved by said clearing system forming a compliance system for establishing predetermined criteria necessary to detect illegal trade practices, coupling said compliance system to said trading system and said clearing system for detecting any illegal trade practices as indicated by said predetermined criteria, and confirming the execution of the transaction immediately to both buyer and seller whose bid and offer is matched.

BRIEF DESCRIPTION CF THE DRAWINGS

These and other more detailed objects and advantages of the present invention will be seen in relation to the accompanying drawings in which:

FIG. 1 is a diagrammatic representation of the novel automated futures trading system;

FIG. 2 is a chart showing the relationship of the trading system to the clearance system and the compliance system;

FIG. 3 is a diagrammatic representation of the hardware configuration of the remote terminal for the trader who may be a principal or agent;

FIG. 4 is a diagrammatic representation of the remote terminal sending an order to the central terminal or host computer in the trading system;

FIG. 5 is a diagrammatic representation of the host or central computer in the trading receiving orders from a multiplicity of terminals and processing those orders;

FIG. 6 is a diagrammatic representation of the memory storage circuits of the host or central computer in the trading system for storing the bids or offers by time, price and quantity and for updating the price field in the memory when a new high or new low price is submitted;

FIG. 7 is a diagrammatic representation of the central computer or host hardware in the trading system which processes the signals received as order signals, administrative inquiries or morning wakeup information or read transmission request for incomplete data;

FIG. 8 is a diagrammatic representation of the host or central computer hardware in the trading system illustrating how an immediate order is processed by the central computer;

FIG. 9 is a diagrammatic representation of the host or central computer hardware in the trading system illustrating how a conditional order is processed;

FIG. 10 is a flow chart of the trading system illustrating the overall order flow of the remote terminal;

FIG. 11 is a partial flow chart of the trading system central processor illustrating the data flow required to process the received bids and offers;

FIG. 12 is a flow chart illustrating how the remote terminal or traders system receives the execution information from the central or host computer in the trading system;

FIG. 13 is a flow chart diagram of the manner in which the orders are queued in the host or central computer in the trading system;

FIG. 14 is a flow chart illustrating the automated updating process of the host or central computer in the trading system;

FIG. 15 is a flow chart representing the public pricing reporting process of the host or central computer in the trading system;

FIG. 16 is a detailed diagrammatic representation of the clearing system as well as its association with the trading system and the compliance system;

FIG. 17 is a detailed diagrammatic representation of the compliance system as well as its association with the trading system and the clearing system;

FIG. 18 is a diagrammatic representation of a portable terminal coupled to the trading system for communicating buy, sell and trade information to and from the trading system, and

FIG. 19 is a schematic representation of the portable terminal itself illustrating the details thereof.

DETAILED DESCRIPTION OF THE DRAWINGS

FIG. 1 is a diagrammatic representation of the novel automated futures trading exchange generally designated by the numeral 10. It includes a central exchange 11 having a trading system 12 including a host or central processor 13 coupled through modems 14 and 16 to

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remote terminals 18 and 20. The remote terminals 18 and 20 may be either "smart" terminals or "dumb" terminals. Thus, if remote terminal 18 is a "smart" terminal, it may include a microprocessor 22 which would include a keyboard and a display for text editing which is associated with a memory or storage unit 24 through connection 26, a printer 28 through connection 30 and an output on connection 34 to modem 32. The output of modem 32 may be transmitted on common communication lines 36 to the modem 14 on the premises of central exchange 11.

The central processor of trading system 12 of the central exchange 11 receives bids or orders from the remote terminals 18 and 20. It is obvious that any number of remote terminals 18 and 20 may be used but for simplicity of the drawings and discussion thereof, only two of the remote terminals 18 and 20 are shown in FIG. 1. Each of the remote terminals 18 and 20 will be in the possession of an exchange member and are given an identification number for that member. The identification number must be entered into the system by the remote terminal 18 or 20 before the central processor of trading system 12 will accept the data from it. Thus, the central processor of trading system 12 validates each terminal input by checking the terminal identification number. If the identification number is correct, the central processor of trading system 12 stores the order in its memory queue by time, quantity and contract price. It then executes matching bids and offers and clears the trades simultaneously. The central processor of trading system 12 also reports the last sale by time, quantity and price by commodity or contract. It also reports all bids and offers as they are received and notifies the traders at the remote terminals of filled or unfilled orders. It can access its memory to report various market conditions and transactions and maintains a detailed trade history for each trade member. Finally, it provides the necessary trade data for settlement and compliance with the rules of the exchange.

A clearing system 38 receives data from the central computer of trading system 12 on connection 40 and clears all trades based upon exchange rules and the like as will be discussed more completely hereinafter in relation to FIG. 2. The output of the clearing system 38 is coupled to the output of the central processor of trading system 12 on line 42 for transmission as needed through modems 14 and 16 to the remote exchanges 18 and 20 respectively. In like manner, a compliance system 44 receives data from the central computer of trading system 12 on connection 46 and checks that data to see if it meets predetermined limits or requirements established for each exchange member. It also provides information on connection 48 to inquiry terminals 50 to answer inquiries from exchange officers who ensure that the system rules are being complied with. This will be discussed more fully hereinafter with relation to FIG. 2. A surveillance system 51 is coupled to the central processor 12 by connection 53 to enable exchange officers to review all information relating to trading.

FIG. 2 is a chart illustrating the systems relationships among the trading system 12, the clearing system 38 and the compliance system 44.

Thus, the trading system 12 receives the trade data and verifies the validity of the terminal submitting the data by terminal identification number or broker number as shown in block 52. It also stores data relating to the activity of any particular commodity so that all information as to what is happening immediately to that

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commodity is available. Also it does trade matching by surveying all bids and all offers and finding a match, if one exists, between the bids and offers. It also coupled the trading information through connection 54 to the clearing system 38 as illustrated by block 56 so that the clearing system can determine the position of each member. Inasmuch as each member is limited in the amount of trading that can be done, the clearing system 38 is constantly checking so that the limitations cannot be violated. In addition, the output of the trading system 12 from block 52 on line 54 is also coupled to the compliance system 44 to block 58 in order that traders or member's activities can be monitored and reports can be compiled illustrating the actual trades of each of the members or traders.

Also, the trading system 12 will provide news and statistics relating to a particular commodity such as movement of oil, changes in prices and the like as well as a morning market report as illustrated by block 60.

In addition, the trading system 12, as represented in block 62, provides for each remote terminal the number of trades open and outstanding and thus provides interim position reports by personal identification number of the trader or member. That information is also coupled on line 64 to block 66 of the clearing system 38 which makes preparation for delivery notice and allocation and tracking and thus keeps track of what orders were received from whom and sold to whom, where and the like. In addition it keeps track of the margins or monies required relative to delivery of commodities. It also provides for a release to the exchange when the plans of both the buyer and the seller change. Further, the trading system 12 provides for market surveillance which allows exchange officers to monitor all trades taking place so that any peculiarities in trading can be detected thus preventing fraudulent trades or manipulations of the market.

Also, as represented by block 70 in the trading system 12 of FIG. 2, the trading system 12 can provide communications with traders or members through their remote terminals and report delivery of commodities and any commodity pricing information to any trader or member. In addition, the trading system 12 can receive administrative position reports and transfers from the clearing system 38 in block 72 on line 74 and communicate that information to traders or members. Also, as represented by block 76 in the trading system 12, after hours entrys including housekeeping functions, such as transfers and corrections, can be sent to block 72 of the clearing system 38 on line 78 so that the clearing system 38 can use that information for accounting, investing and the like.

In addition, the trading system 12 can provide position limit controls for the members or traders as illustrated by block 80 and thus keep track of the amount of trading that any one particular terminal is allowed to handle. Finally, as represented by block 82 of the trading system 12, security of the system can be maintained as, for instance, checking the number of the terminals on the line and their identification numbers.

In regard to the clearing system 38, as stated earlier, block 56 receives data on trading from the trading system block 52 and keeps track of the trading positions of each of the members. Also, as represented by block 84 in the clearing system 38, margin requirements for each of the members are maintained, so that the margin requirements are tabulated and kept on file. Further, as

shown in block 72, the accounting functions are maintained by the clearing system 38.

When actual delivery of commodities is required, the clearing system 38 keeps note of that information as represented in block 86. Finally, as represented in block 88 the clearing system maintains a file of physical verifications of what took place over some period of time as for instance whether actual deliveries of commodities were made or the trade was just a paper exchange.

The compliance system 44 as represented in block 90 keeps track of the time sorted trade activity for any particular trader or clearing member. Thus, a file history of each trader is maintained.

Also, as stated earlier, the compliance system 44 as represented by block 58 provides trader member reports on all of their activity so that this activity can be monitored.

In addition, as represented by block 92, a complete history of all trades of any particular trader is maintained including the date of the trade, the price of the trade, the quantity, the commodity and the like.

Block 94 of the compliance system 44 relates to special programs which may be maintained for special problems which are to be monitored for compliance. In addition, block 96 of compliance system 44 represents a monitor for patterns to enable detection of trading irregularities, transfer of positions, cross trades and the like. Also, as represented by block 98, the financial condition of each member is maintained and a warning of a dangerous financial condition of a member is provided for monitoring purposes. This history of record of the members' financial positions as traders is recorded as represented by block 100 for monitoring by exchange officers. In addition, block 102 represents the position of the traders relative to their net worth and thus enables the trade exchange officers to analyze the risk involved in allowing a trader to operate in the system under certain limits which are set. Finally, block 104 represents a check list of certain factors relating to each trade exchange member to assure that they are in compliance with the regulations established by the exchange.

Thus, as can be seen in FIG. 2 the trading system 12, clearing system 38, and compliance system 44 work with each other to transact trades, monitor the operation of the exchange, ensure that all traders are operating within preset parameters, and maintain a history of the operation during the automated processing so that compliance with preset conditions is maintained and the trading history of each member is reviewable.

FIG. 3 is a diagrammatic representation of a remote terminal 18 which is coupled by a local communication lines 36 to a host or central processor of the trading system 12 of the futures trading exchange 10 shown in FIG. 1. The remote terminal 18 includes a keyboard 106 having keys 108 for the entry of data and which produces output signals on line 110 which is coupled to a terminal 112. As stated earlier, the terminal may be either a "dumb" terminal or a "smart" terminal. If it is a smart terminal, it may be a microprocessor having its own internal memory as well as additional external memory 114 coupled thereto by means of lines 116 which may be used for additional storage. The information stored by the terminal 112 may be displayed by video display 118 or printed by printer 28. Video display 118 has thereon a cursor 120 which is movable by activation of certain of the keys 108 on keyboard 106. When the processor 112 receives information from the central processor in the futures exchange system 10, it

arranges the received bids or offers on the basis of price and the time received by the central processor and displays in the remote terminal 118 the arranged bids and offers and displays all bids in descending price order and all offers in ascending price order. If the user's bid or offer needs to be modified, the movable cursor 120 on the display 118 may be moved along the displayed bids and offers of the user and the data therein modified through keyboard keys 108. All of that information is, of course, stored in the terminal 112 and associated memory 114. The communication that needs to take place with the trading system 10 is done on line 34, through modem 32 and local communication lines 36 to the central processor in the trading system 12 of futures trading exchange 10.

An example of a system for operating from a remote terminal 18 to the central processor 13 of the automated trading system 12 is illustrated diagrammatically in FIG. 4. The order is keyed into the system through keyboard 106 and keys 108 thereon. The information typed into the system would include price, quantity, whether it is a buy or sell order, the type of contract (commodity type), the account type (whether its personal, customer, broker, and so forth) and the identification of the clearing member (or whether the buyer or seller is sponsored by a clearing member). This information is coupled in code via connection 110 to the processing unit 122. Also coupled to processing system 122 is code unit 124 which automatically produces a terminal identification signal on connection 126 which is transmitted first by the processing unit 122 on local transmission lines 128 to the host or central processor 13 of the trading system 12. The terminal I.D. number may include the account type (the terminal identification number), the clearing member identification number, the trader identification, and transaction number. The central computer 13 processes this order and stores it in the pending file 130 of its memory. It can also display the information on display 132 and print it with printer 134.

The details of the processing of the incoming order by the central processor 13 is shown in FIG. 5. In addition to one order being generated by a remote terminal 136 and sent to the central processor 13 via communication lines 138, other orders are being received from other terminals 142 and are coupled through local communication lines 142 to central processor 13. After the signals are received by central processor 13, they are processed through a comparator 144 which compares all offers to bids and all bids to offers to see if the order can be matched with a corresponding bid or offer and processed or executed. If it cannot be executed, it is coupled through line 146 to a commodity or contract price file 148 where it is stored according to time received, price asked and quantity of the commodity. This information, of course, may be coupled to a display 150 through connection 152 for visual inspection.

If the comparator 144 determines that the order can be matched or executed, it produces an output on connection 154 which is coupled to pending file 156 and stored. If the order can be matched with a corresponding bid or offer, the execution of the trade takes place and the information is coupled through connection 158 to printer 160 for confirmation of the execution. In addition, the output of pending file 156 on line 162 is coupled to printer 162 for printing of the confirmation of the order received. Obviously a common printer may take the place of both printers 160 and 163. Finally, the

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stored information in pending file 156 may be coupled through connection 161 to display 164 where that information can be viewed by operators of the exchange.

Further details of the system of FIG. 5 is shown in FIG. 6. Thus the host or central processor 13 can receive cancellation of orders, modification of orders or orders that can be executed. Again, if comparator 144 finds that a match occurs with a particular order and an execution can occur, a signal is produced on connection 153 which is coupled to comparator 155 which determines whether or not there is a new high or new low price. If a new high or a new low price is determined, that information is coupled through connection 157 to the memory 159 where the commodity file and the day file is updated with the new high or the new low price for that day and for that commodity. That information is also coupled through connection 163 to memory 165 to update the central processor price field and quantity file. In addition, of course, the confirmation of the order and the execution and the display thereof is taking place as shown in FIG. 5.

If comparator 144 determines that the order cannot be executed because it is a particular type of order or because it has been cancelled or modified or does not match a bid or offer, the signal is coupled to comparator 166 which determines the type of contract or commodity to which the order relates and then couples that information on connection 167 to another comparator 168 that determines whether the order is a bid or an offer for that particular type of commodity. If it is an offer, the signals are coupled through connection 170 to memory queue 172 which records the offer in the queue by time, price and quantity.

If comparator 168 determines that the order is a bid, it produces an output on connection 174 which is coupled to memory 176 where the bid information is recorded in the bid queue by time, price, and quantity. Thus, the information is stored for future use when a match can be found. In like manner, if the order is a cancellation or modification of either an offer or a bid then the bid queues and offer queues are modified accordingly.

A more detailed diagrammatic illustration of the central processor 13 and the processing system of the futures trading exchange 10 is set forth in FIG. 7. The input on common communication lines 178 from the remote terminals (18, 20 in FIG. 1) is received by the central processor input terminal 180 which produces an output on line 182 that is coupled to a comparator 184. The comparator looks at memory 186 through connection 188 to compare the signal codes received with a stored trader and contract file code. If the input signal cannot be verified that the terminal and the trader are valid, a signal is produced on line 190 which is sent back to the remote terminal indicating that the input signal is not acceptable. If the comparator 184 determines that the input signal is valid then it produces an output on line 192 which is coupled to transaction identifier 194. This unit 194 determines whether the transaction is a new order, an administrative inquiry, or a morning wakeup or retransmit process.

If an administrative inquiry is received from a remote terminal, a signal is produced on line 196 which is coupled to memory 198 for retrieving the information in the files about which the inquiry is made. An output is then produced on line 200 which is retransmitted through common communication lines 202 to the remote terminal requesting the information.

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If morning wakeup information is required or a retransmission of data is required, the output of identifier unit 194 on line 204 is coupled to the memory 206 to obtain the information for the morning wakeup and the output on line 208 is again transmitted through local communication lines 202 to the remote terminal requesting the morning wakeup.

If identifier unit 194 determines that the incoming signals constitute a new order, it produces an output on connection 210 to the order process circuitry 212 in the central processor unit for processing. The output of circuitry 212 on line 214 is coupled to a time stamp unit 216 and sent through connection 218 to the memory history file 220. Thus, a file history of all orders is kept in memory 220.

As the order is time stamped and filed in the history file of memory 220, it is also coupled through connection 222 to decision unit 224 which decides whether the order is a buy or sell order. The processing of the buy and sell orders are exactly the same and so only a discussion of the buy order processing will be disclosed in detail. The signals which are produced by decision unit 224 on line 226 and coupled to the sell processing network will be the same as that which is discussed for the buy processing network except that separate storage queues would be used. The output of decision unit 224 on 228 occurs if the order is a buy order and is coupled through decision unit 230 which determines whether or not the order is an immediate order or a conditional order. The output of decision unit 230 on line 232 is coupled to circuit 234 if it is an immediate order or is coupled to circuit 236 for processing if it is a conditional order. If the conditional orders considered by circuit 236 meet all of the required conditions, then a signal is produced on line 238 which is coupled to the immediate order circuit 234 for processing.

The immediate order processing circuit 234 in FIG. 7 is shown in detail in FIG. 8. The output of decision unit 230 on line 232 is coupled to open order memory queue 240 if it is a market order, to open order memory queue 242 if it is an order modification request and to open order memory queue 244 if the input is an order cancellation. These memory queues store the signals on a first come, first served basis.

If the input signal on line 232 is a market order, it is placed in open order queue 240 which produces an output on line 246 which is coupled to a detector 248 which checks to see if the order would match with a corresponding existing open order. If no match occurs, the output signal on line 250 is coupled back to the open order queue 240 to maintain the market order so that the order can be continually sent to detector unit 248 until a match is found. If a match is found, the detector unit 248 produces an output on line 252 which is coupled to timing unit 254 where the order is time stamped at the time the transaction takes place. The signal is then coupled on line 256 to memory 258 where the transaction is recorded and transferred via line 260 to master trade file 262. Also, the output of memory 258 on line 264 is coupled to a confirmation circuit and an execution circuit. The order is confirmed in confirmation circuit 266 which produces an output on line 268 that is coupled to a terminal 270 where the confirmation is broadcast to the buyers and sellers at the remote terminals on common communication lines 272.

At the same time, the signal is also coupled to execution circuit 274 which determines that there is a matched trade and stores that information. The infor-

mation is also coupled on line 276 to a price reporting system 278 which transmits the signal on common transmission lines 280 to vendors 282 who desire the price quotations. At the same time, the circuit 274 produces an output on line 284 to terminal 286 to broadcast the last sale to buyers and sellers over communication lines 288 to remote terminals.

If the order received on line 232 from decision unit 230 in FIG. 7 is a modification order, it is coupled to open order queue 242 which produces an output on line 290 to match determining unit 292. If no match can be found for the modified order, an output signal is produced on line 294 which is coupled to order confirmation unit 266 and sent back to the remote terminals as a confirmed received order as indicated previously.

If a match can be obtained, unit 292 produces an output on line 296 that is coupled to time unit 298 which time stamps the modified order and sends the signals on line 300 to a memory 302 which deletes the old trade information stored in master file 262 and adds the new data via line 304. At the same time, it produces an output on line 306 which is coupled to the execution matching trade unit 274 for processing as indicated previously.

If the signals received from the decision unit 230 on lines 232 in FIG. 7 are cancellation order signals they are sent to open order queue 244 which produces an output on line 308 to matching unit 310. If a match has already occurred indicating that the bid or offer has been accepted and cannot be cancelled, a signal is produced on line 312 which is coupled to the time stamp unit 298 and is processed as described previously. If no match occurs, indicating that the order is open and outstanding and can be cancelled, a signal is produced on line 314 which is coupled to the execution circuit 274 for execution and the order confirmation circuit 266 both of which are transmitted to the remote terminals as described previously.

The conditional order circuit 236 in FIG. 7 is disclosed in detail in FIG. 9. If the signal produced by decision unit 230 on line 232 in FIG. 7 is a conditional order it will be coupled on line 232 to the conditional order circuit shown in FIG. 9. The conditional orders are either "fill or kill" or "limit up," "limit down," "time order," "at market" , "stops," and "spreads/straddles." Other types could be established if needed or desired. If the conditional order is a "fill or kill" order it is coupled to open order memory queue 316 where it is stored and an output produced on line 318 to circuit 320 which determines whether or not the "fill or kill" conditions can be satisfied. If the order can be filled, circuit 320 produces an output on line 322 which is coupled to match circuit 248 in FIG. 8 and the signal processed as described previously. If the condition cannot be satisfied, then the order is killed by an output being produced on line 324 which is coupled to time stamp unit 298 in FIG. 8 which produces an output on line 300 to the delete data circuit 302 for executing the cancellation in Master Trade File 262 as explained earlier and to confirmation circuit 266 where the signals are processed as described previously in relation to FIG. 8 and confirmed to the remote terminal.

If the signal on line 232 from FIG. 7 is a conditional order other than a "fill or kill" order it is coupled to open order queue 334. That memory produces an output on line 336 which is time stamped at unit 338 and stored in master trade file 330. In addition, that information is coupled from time stamp unit 338 on line 340 to

the matched trade information circuit 274 and order confirmation circuit 266 for processing as described earlier with relation to FIG. 8. Open order queue 334 also produces an output on line 342 to decision unit 344 to see if the conditions are satisfied. If they are not, they are returned through line 346 to open order queue 334 for reprocessing in an attempt to satisfy the condition. If and when the condition is satisfied, the output of circuit 344 on line 348 is coupled to the match decision circuit 248 in FIG. 8 for processing as described previously.

The flow chart for the remote terminal or trader system is shown in FIG. 10. A trader at the remote terminal site, enters data into the system through a keyboard input 350 which produces data signals on line 352 indicating either an order or data request. The decision unit 354, whether the signal is an order or a data request, couples those signals through line 356 to a decision circuit 358 to decide whether the data requested is order data or price data. If it is order data, the signal is coupled on line 360 to a unit 362 which stores the order as a pending order by contract or commodity, price and quantity. This information is stored in memory 364 and can be coupled to line 366 for display by display unit 368. In like manner, if the requested data is price data, decision circuit 358 produces an output signal on line 370 which again is coupled to a circuit 372 which searches for and retrieves data from the memory by contract (commodity) and price. This information is obtained from memory 374 and can be coupled through line 376 to display 380 for display for the operator.

The data entered by the trader through keyboard 350 as order data or a data request to the control processor of the futures exchange is coupled through line 382 to a circuit 384 which assigns a transmission number and appends the appropriate terminal identification number. The circuit 384 also produces an output on line 386 which couples order data to display 388 and to a circuit 390 which loads that information on line 392 to memory 394 for storage purposes as a pending order.

After circuit 384 assigns the transaction number and appends the terminal I.D. number to the data, the data then is coupled through connection 396 to modem 398 for transmission on common transmission lines 400 to the central processor of the futures trading exchange.

FIG. 11 is a flow chart diagram of the exchange system wherein the central processor 12 receives the incoming orders or data requests, processes them and retransmits the pertinent information to the remote terminals for storage. The exchange system receives the order information from the remote terminal on line 400 and where it is received and stamped according to the time received as at step 402. The signal is then coupled on line 406 to a decision circuit as at step 408 which determines whether or not the order is valid and whether the terminal is valid. This step simply compares the codes received from the remote terminals with the codes stored in the central processor and if it determines that the received signals are not valid an output is coupled on line 410 to decision step 412 which decides whether the terminal is invalid or the contract or price is invalid or both and, if the terminal identification is invalid, it produces an output signal on line 414 which is coupled to step 416 which formats a message indicating that the terminal identification number is not authorized and is rejected. This information is not only coupled on line 418 where it can be printed as at step 420. It is also coupled through line 422 to a storage unit as at step 424 for storage in the master file. The rejection

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signal on line 418 is also coupled to a circuit as at step 426 which sends the message signal indicating that the terminal is unauthorized on line 428 to a modem unit as at step 430 which produces an output on line 432 that is the common communication line to the remote terminal.

If it is the contract (commodity), price or quantity that is determined to be invalid, the signal is produced by a decision unit as at step 412 on line 434 to a circuit which formats a message as at step 46 indicating that the contract or price range is invalid and a rejection signal is produced on line 438 which again is coupled to a circuit to produce an output as at step 426 on line 428 which is transmitted to the remote terminal as stated previously.

If the signal received from the remote terminal is valid, an output signal is produced as at step 408 on line 440 which is coupled to a decision unit which determines the signal to be either a conditional signal or a market signal as at step 442. If the signal is a conditional signal, it is coupled through line 444 to an order queue circuit for processing as at step 446 as will be described later in relation to FIG. 13. If the signal can be processed, an order queue produces an output as at step 446 on line 448 which is coupled to a match circuit. In that circuit as at step 450, the buys are matched with offers and sells are matched with buys and those orders are time stamped.

If the decision circuit determines that the order is a market order as at step 442, then it produces an output signal on line 452 which is coupled to a match determination circuit. If no match can be found as at step 454, a signal is produced on line 456 which is coupled to resubmit circuit which transmits the signal as at step 458 on line 460 back to the input of the match circuit which continues trying to match the order with a corresponding buy or sell as at step 454. When a match is obtained, an output signal is produced on line 462 which is coupled to circuit where the buy is matched with a sell or the sell with the buy and the transaction is time stamped as at step 450.

The output of the time stamp circuit at step 450 is coupled first on line 452 to price reporting system which is shown in detail in FIG. 15 and which is a public price reporting process as at step 454 to enable the public to see the price of the transactions that are occurring.

The output of the time stamp unit at step 450 is also coupled on line 456 to decision unit which determines whether or not the total quantity of the order can be satisfied as at step 458. If only part of the order can be satisfied and there is a partial match, that portion which is not matched is coupled through path 460 back to the order queue where it is reprocessed as in step 446 until a match can occur.

If a match can occur for the received order, the output of step 458 on line 462 is coupled to a unit which prepares the confirmation message to be sent to the buyer and seller at the remote terminals as at step 464. This output is coupled on line 466 to a modem which transmits the signal on line 432 back to the remote terminals as at step 430.

In addition, the modem unit produces an output signal at step 430 on line 468 which is coupled to a master trade file in the central processor which creates a master trade record including one record for the buyer and one for the seller as at step 470. This record enables an output on line 472 to be stored in the master file index as

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at step 474 which can be accessed by the clearing system as at step 38, the compliance system as at step 44, and surveillance system as at step 51. These systems are used as has been described earlier with reference to FIGS. 1 through 9.

FIG. 12 is a flow chart of the processing of the information transmitted from the exchange system central processor 12 back to the remote terminal 18 or 20. The data from the central processor 12 is coupled on line 432 to the confirmation circuit as at step 476 in the remote terminal 18 or 20. That information is coupled through connection 478 to the printer which produces a hard copy of the confirmation message as at step 480. The output of the confirmation circuit at step 476 is also coupled through connection 482 to the pending file control circuit as at step 484 which produces an output on connection 486 to delete the pending order stored in memory as at step 488 if the order has been filled. Thus, as an order is matched and confirmed, it is deleted from the remote terminal pending order file at step 488.

The pending file control circuitry also produces an output on line 490 which is coupled to decision network to determine whether an order or a trade has been completed as at step 492. If the trade has been completed, the decision network at step 492 produces an output on line 494 which is coupled to a trade confirmation circuit at step 496 that produces an output on line 498 to cause a control circuit to produce an output at step 500 on connection 502 which stores the completed order in memory as at step 506. The display at step 508 is coupled to the memory at step 506 through connection 510 and the filled order can be displayed for visual observance. Also, a printed copy of the order can be produced by the printer at step 512.

FIG. 13 is a flow chart diagram of the order queue shown as step 446 in FIG. 11. If the decision network at step 442 in FIG. 11 decides that the incoming order is a conditional order, it couples a signal on line 444 to be prioritized by time, price and quantity as indicated at step 530. The output at step 530 is coupled on line 532 for automatic updating and filing as at step 534 which is disclosed in detail in FIG. 14. Step 530 also produces an output on line 536 to a code unit which appends the condition code to the order as at step 538. Thus, a code exists for price limit condition, for the time condition, or the stop condition. Whichever condition is attached to that particular order, it is coded in this step 538 and the output is produced on line 540 to a network which scans the open order file in the central computer to see if a match can occur for those particular conditions as at step 542. Sellers look to the stored bids and buyers look to the stored offers. That output on line 544 is coupled to decision unit to see if a match can occur as at step 546. If no match can be made under those particular conditions, the request is sent back on line 548 to the input of the open order file to continue to scan the open files looking for a match as at step 542. If a match can occur, an output is produced on line 550 to a control unit which deletes the order from the open order file as at step 552 and produces the output on line 448 to a match circuit as at step 450 shown in FIG. 11 where the order is time stamped.

As will be recalled with relation to FIG. 11, if only a part of an order can be satisfied, the part of the order which could not be matched is coupled on line 460 to the prioritizing circuit as at step 530 in FIG. 13 and the signal is processed as described previously in relation to a conditional order.

An automatic update file at step 534 receives the data on line 532 from the prioritizing network at step 530 and updates the files automatically to keep track of the conditional orders. The automatic update file process at step 534 produces an output on line 428 which is coupled to the input of a send confirmation circuit at step 430 in FIG. 11 from where the information is sent back to the remote terminal for storage.

The details of the process of automatic updating the files at step 534 are shown in the flow chart set forth in FIG. 14. The information is received from the prioritizing network as step 530 on line 532 and is coupled to a decision network as at step 554 in FIG. 14. If the signals are representing a trade, they are coupled on connection 556 to control circuit which stores that information at step 558 in computer memory at step 560. A signal is also produced on line 562 to a unit at step 564 which prepares a message for distribution to the remote terminals. This output message on line 566 is coupled to transmitting unit at step 568 for transmission on line 428 to the remote terminals.

If the message received is for an order, a decision unit produces an output at step 554 on line 570 which is coupled to an assignment order update control unit that produces an output at step 572 on line 574 and stores the data in the order update file at step 560. The assignment order update unit at step 572 also produces an output on line 576 to a message preparation unit at step 578 that prepares the message and couples it on line 580 to a transmitting unit at step 582 which produces an output on line 428 to the remote terminals.

The public pricing reporting process at step 454 in FIG. 11 is disclosed in detail in FIG. 15. The signal on line 452 from a match circuit at step 450 in FIG. 11 is coupled in FIG. 15 to message creating unit at step 584 which creates the output message for the contract, the quantity and the price. That message is coupled on line 586 to a transmitting unit at step 588 which sends the price report to the public quote vendors on commercial communication lines 590 to various users represented at step 592.

FIG. 16 is a detailed diagrammatic representation of the clearing system 38 as well as its association with the trading system 12 and the compliance system 44. Thus, trading system 12 collects all trade activity and input data on line 594 and forwards it to the master trade record file 596. The master trade file also transfers information to backup file 598 for redundant purposes. Thus, the master file 596 contains all trade related data which supports both the clearing system 38 and the compliance system 44. Master file 596 serves as an audit tool so that all buy and sell transactions are maintained in the record for review at a later date.

Clearing system 38 establishes Commodity Futures Trading Commission (CFTC) requirements and regulations to be observed during the trading process. It determines the validity of each transaction by comparing the transaction data with the CFTC requirements and regulations. The clearing system 38 receives data from the master trade file 596 on line 600 and sorts the data by clearing member and trade type (house/customer). Further, the clearance and position module 602 calculates the gross position report for the CFTC. This means that it keeps track of all trades of any member in total. It compares trades with position limits established at position limit unit 604 to see that the trader is staying within limits which are set by the exchange through control terminal 50 on lines 606. Thus, the exchange enters

through control terminal 50 (a keyboard, for example) the data necessary to establish position limits for each customer and stores those in clearance and position module 602. The gross position report of any particular trader can be made into a printout at 606 so that a written copy of the position of each member can be obtained as necessary. In addition, the clearance and position module 602 calculates net and offset positions by clearing member (house, customer and total). These positions can also be printed at 608 and 610 to have a written report. Thus, clearance and position module 602 verifies position limits and open positions by commodity and members.

In addition, clearance and position module 602 forwards positions through the margin processing module 612 on line 614 for margin calculation. Again, the margin limits are established through control terminal 50 which couples an output on line 616 to the margin processing module 612 for establishing those limits. At that point, the margin processing module 612 calculates original (initial) and variation margin requirements. It also calculates advance and special margin requirements which have been entered through control terminal 50. It summarizes margin requirements by clearing member and house/customer activity. This data can then be forwarded on line 618 to the financial and report module 620 which prepares clearing reports for clearing corporation members and the exchange. It provides a trade register, position and margin summary and the like. It updates the bank account and provides information for reconciliation module 622. It also prints the clearing reports at 624 where written reports are desired. These written reports can be made available to the exchange itself, to members of the exchange, and to the CFTC.

FIG. 17 is a detailed diagrammatic representation of the compliance system 44 as well as its association with the trading system 12 and the clearing system 38 as shown in FIG. 16.

The compliance system 44 establishes predetermined criteria necessary to detect illegal trade practices or trade patterns which would adversely affect the commodity market and automatically compares the transaction data with the predetermined criteria thereby enabling detection of any such illegal trade practices or trade patterns. It also records various reports of members as described hereafter and provides reports to the CFTC as required.

The input to compliance system 44 on line 626 is received from the trading system 12. Since the compliance system is intended to ensure that no manipulations of the market are occurring, it receives all order and trade related data at input unit 628 and sorts the data by major category such as the trader, clearing member, contract, price and time of buy or sell. That information is coupled to memory 630 on line 632 for storage and thus a standard file is built up by major category for retrieval or analysis. If for any reason any of that information needs to be checked to ensure that no irregularities are occurring in the market, the requested data is entered through a keyboard of inquiry/control terminal 50 and the information is either displayed or printed as an output at 634. In addition, if there are complaints by customers, traders, and the like, that information is entered through keyboard 50 and coupled through lines 636 to complaint file 638. Those complaints are stored and if the enforcement staff needs to make inquiries concerning those complaints they can enter a retrieval

input through keyboard 50 and the particular complaint access can be printed or displayed at 634. Also, those complaints are coupled through line 640 to the data file 630 where they are stored for up to 6 months. Any information over 6 months is coupled through line 642 to storage 644 for longer storage. The complaint file storage 644 maintains a tape record of all transfers over 6 months old in predetermined format. Also, it can notify staff of the aging of complaints through the printer 634 and monitor any responses from the staff.

Finally, the information stored in the complaint file 638 can be coupled through line 646 to unit 648 which prepares daily and monthly reports. They can be displayed on screen 650 and distributed as necessary in the form of a hard copy to the CFTC and the customers at 652. The daily reports can be printed at 654 and the reports for use by the exchange can be printed at 656. Thus, the compliance system 44 time sorts all trade activities, provides trader/member reports, keeps a detailed history of all the trading activities of any trader/member, enables special programs to be activated in order to detect any unusual patterns of trading, provides data on crossed trades including transfer of positions and trading irregularities, provides an early warning when trading data illustrates some irregularity, keeps track of the members financial positions by maintaining information on fiduciary status, provides an analysis of any risk which may accompanying any particular type of trade based on the members financial capabilities, and amount of trades and also provides an audit checklist so that any trading pattern histories can be reviewed and followed up.

FIG. 18 is a diagrammatic representation of a portable terminal coupled to the trading system for communicating buy, sell and trade information to and from the trading system by telephone. The portable terminal 658 is shown coupled through line 660 to modem 662 which translates the information into data sufficient for transmission on telephone line 664 to the trading system modem 666 which produces an output on line 668 and is coupled to the trading system 670. The modem 658 includes a keyboard 672, a display 674 and an identification circuit 676. This system enables the trader to carry a portable terminal to some location apart from his remote terminal and allows him to communicate with the trading system over the phone lines to determine the highest bid made, the lowest offer made and the last trade price of a particular commodity. The information received from the trading system is displayed so that he can make the proper decision. He can then make an offer or bid at a price he selects or at the market price. The bid or offer which the user makes is also displayed. When he is satisfied with the offer or bid he wants to make, he can enter the data which is then transmitted to the trading system 670. The trading system 670 first inspects the identification number which is transmitted from the portable terminal 658 and if the identification number is acceptable, the trading system will either return the requested data to the remote terminal or accept the transmitted data from it.

FIG. 19 is a schematic representation of the portable terminal itself illustrating the details thereof.

The portable terminal 658 includes a display 674 and a numerical entry keyboard shown generally at 672. When it is desired to communicate with the trading system 670, a telephone receiver is placed in a cradle 663 in modem 662. An access code must be dialed on the telephone to reach the trading system 670. When the

trading system 670 receives the access code, it returns a signal to the remote terminal 658 indicating that it is ready to receive information. If the user desires to know the current bid price, offer price and last trade price of a particular commodity, he simply depresses I.D. key 678 which transmits the identification code in this particular portable terminal 658 to the central processor. If the central processor recognizes the identification number, it sends back a signal (not shown) to indicate on the display that it is ready to receive or send requested data. The operator then depresses the desired commodity button 686, 688 or 690 and data switch 680 and the information requested is transmitted by the trading system 670 to the portable terminal 658.

If the user then wishes to make a bid or an offer, he simply depresses the cancel button 682 and the information on the display disappears. Again, he first depresses key 678 to establish his identity. He then depresses one of the commodity buttons shown generally at 684 which could include, for instance, crude oil button 686, heating oil button 688 or any other like commodity button 690 generally designated in the drawing by the letter X. He then depresses the appropriate keys 672 to determine price of the bid or offer which is displayed on display 674, then depresses price button 692 and buy button 694 or sell button 696 depending upon the transaction. He also may depress market button 698 to indicate that he wants to purchase at the market price rather than establishing any particular price through keyboard 672. When he has taken those steps and is satisfied with the entry shown on the display indicating that he is buying or selling a particular type cf commodity at a particular price, he then depresses Enter button 700 which causes the data to be transmitted on line 660 to modem 662 where it passes over the telephone lines 664 to the trading system 670. If an invalid identification number is transmitted, the computer returns a not accepted message because of invalid identification. If the identification number is accepted, and if the buy or sell transaction can be completed, the trading system 670 notifies the remote portable terminal 658 on the display 674. However, the actual transaction is recorded at the remote terminal of the trader which is fixed at his normal location for storage purposes. The remote terminal 658 does not include available storage to keep track of that kind of information. It simply allows transaction data to be reviewed and a buy or sell trade to be made and the resulting buy or sell, if any, is recorded in the trader's fixed terminal at its particular location. Since it will have the same identification number as the remote portable terminal 658, the computer can so distinguish and send the information for storage o the proper fixed terminal.

Thus, there has been disclosed an automated futures exchange trading system in which all remote terminals that are associated with the exchange are given an identification number. These terminals can communicate with the central processor of the exchange system which validates the terminal input, cues the orders being received by time, size and commodity, executes matching bids and offers and clears trades simultaneously, reports the last sale by time, quantity and price according to commodity, reports bids/offers as they are received, notifies traders of filled or unfilled orders, reports various market conditions and transaction to the remote terminals for use by the traders, maintains a detailed trade history of each member of the exchange and provides the necessary trade data for settlement and

compliance. This unique system provides accurate and precise information, trading based on factual data, assurance of execution and immediate confirmation, control through real time processing of information and surveillance, and the use of computer hardware to implement the process.

While the invention has been described in connection with a preferred embodiment, it is not intended to limit the scope of the invention to the particular form set forth, but, on the contrary, it is intended to cover such alternatives, modifications, and equivalents as may be included within the spirit and scope of the invention as defined in the appended claims.

I claim:

1. A computerized open outcry exchange system for transacting sales of a particular futures commodity contract in varying volumes or lot sizes by members of a futures trading exchange as principals or agents for others wherein bids to purchase or offers to sell said particular commodity contract are made by said principals or agents through remote terminals, said system comprising:

a. means for receiving and storing bids and offers from said remote terminals and automatically completing a transaction of matching bids and offers on a first-come, first-served basis thereby establishing a trading system,

b. means for storing CFTC requirements and regulations to be observed on said buy and sell transactions thereby establishing a clearing system,

c. means coupling said stored CFTC requirements and regulations in said clearing system to said trading system for comparing said transaction with said stored requirements and regulations thereby determining the validity of each transaction,

d. means for storing predetermined compliance criteria necessary to detect illegal trade practices or trade patterns which would adversely affect said commodity market thereby establishing a compliance system, and

e. mean coupling said stored compliance criteria in said compliance system to said trading system and said clearing system for automatically comparing said transaction determined to be valid to said predetermined compliance criteria thereby enabling detection of illegal trade practices and trade patterns which would adversely affect said commodity market.

2. A system as in claim 1 further including:

a. means in said remote terminals for identifying by code said member, as agent or a principal, making said bid or offer, and

b. a central processor in said trading system having means for recording said identify code whereby said agent or principal may be identified.

3. A system as in claim 2 further including:

a. means in said central processor for storing relevant information relating to each received bid or offer including prioritizing each received bid or offer on the basis of price, lot size and time received by said central processor, said

b. display means in said remote terminals coupled to said central processor for receiving said prioritized bids and offers and displaying at least a part of all bids in descending price order and all offers in ascending price order.

4. A system as in claim 3 further including:

a. a movable cursor on said remote terminal display for identifying said member's bid or offer, and

b. keyboard means in said remote terminal for modifying said member's bid or offer identified by said movable cursor by entering data through said keyboard modifying said selected bid or offer.

5. A system as in claim 2 further including:

a. means coupled to said recording means in said central processor for accessing relevant information relating to at least a part of said stored bids and offers for a particular commodity contract, and

b. means coupled to said accessing means for determining the breadth of the market for that commodity contract by displaying the number of bids for any particular number of offers based on said relevant information.

6. A system as in claim 2 further including:

a. means coupled to said recording means in said central processor for accessing relevant information relating to said stored bids and offers for a particular commodity contract, and

b. means coupled to said accessing means for displaying bid or offer lot sizes, last sales price, daily price ranges, and volume of trades of said commodity contracts occurring over any predetermined period of time.

7. A system as in claim 6 wherein said display means displays the variations in lot size, last sales price, daily price ranges, and volumes of trades of said commodity contracts that occur between various ones of said predetermined periods of time.

8. A system as in claim 2 further including printing means at each remote terminal coupled to said central processor for printing the execution of each transaction initiated by a particular terminal including date, time, lot size and price of said commodity contract.

9. A system as in claim 2 further including:

a. means in said central processor for establishing trading limits in dollar volume for any particular remote terminal, and

b. means in said clearing system coupled to said remote terminals for rejecting any bid or offer from said remote terminal that exceeds the trading limits established for each of said terminals.

10. A system as in claim 2 further including:

a. means in said compliance system for accessing said storage means in said central processor, and

b. means coupled to said accessing means for detecting patterns of trading which may be manipulative by displaying times of receipt of said bids and offers, the agent or principal making said trades, or the history of trading of said agent or principal.

11. A system as in claim 2 further including:

a. a printer coupled to said central processor, and

b. means selectively coupling said central processor storage to said printer for printing the volume of trading of any commodity contract over any predetermined period of time.

12. A system as in claim 2 further including:

a. a portable hand-held terminal for receiving and generating buy and sell data for features commodity contracts,

b. a modem coupled to said portable hand-held terminal for converting said generated data to information capable of being transmitted to said trading system and converting said received data to information capable of being used by said portable terminal, and

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c. telephone lines coupling said modem converted information to and from said trading system.

13. A system as in claim 12 wherein said portable hand-held terminal further comprises:
a. a display,
b. a keyboard containing commodity keys, buy and sell keys, numerical entry keys and control keys,
c. means for generating said member identification code uniquely identifying a particular hand-held terminal, and
d. means for storing said transaction in said member remote terminal and only displaying said transaction at said portable terminal.

14. An automated system for transacting a sale of a particular futures commodity contract in predetermined volumes or lot sizes by members of the trading system as principals or agents for others wherein bids to purchase or offers to sell are made by said principals or agents for said particular commodity contract, said system comprising:
a. remote terminals for initiating and transmitting transaction data including buyer's bids and seller's offers,
b. a central processor for receiving said buyer's bids and seller's offers thereby forming a trading system,
c. means in said central processor for completing a transaction by comparing received bids with received offers to find a matching bid and offer,
d. means coupled to said trading system and said remote terminals for storing predetermined trading constraints and approving only those bids and offers coming within said constraints thereby forming a clearing system,
e. means coupled to said trading system and said clearing system for storing predetermined criteria representing fraudulent trading practices and comparing said transaction data with said predetermined criteria thereby establishing a compliance system for enabling detection of said fraudulent trading practices, and
f. means in said central processor for notifying the remote terminals of a completed transaction when a matched bid and offer are found.

15. A system as in claim 14 further including:
a. a storage means in said central processor and
b. means coupled to said storage means for storing said received bids and offers according to time, price and lot size for a particular commodity contract.

16. A system as in claim 15 further including:
a. means in said central processor for matching said bids and offers on a priority basis where first received bids and first received offers are matched, and
b. means coupled to said matching means for completing said transaction of said matched bids and offers on a first received in time basis.

17. A system as in claim 14 wherein said received bids and offers are stored in respective memory queues according to commodity contract by time, lot size, and price.

18. A system as in claim 17 further including means in said central processor for reporting to said remote terminals last sales of a commodity contract by time, lot size, and price.

19. A system as in claim 17 further including means in said central processor for reporting to said remote terminals bids and offers by type of commodity contract as received by time, quantity, and price.

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20. A system as in claim 17 further including means in said central processor for notifying remote terminals of filled and unfilled orders.

21. A system as in claim 17 further including memory means in said central processor for maintaining a complete trading history of each trading system member.

22. A system as in claim 14 further including:
a. means for identifying each exchange member by an electronic code,
b. means in said clearing system for storing limits of trade for each member, and
c. means in said central processor coupled to said trade limit storing means and said exchange identifying means for rejecting any proposed trade from a member that exceeds the established position limits.

23. A method of transacting a sale of a particular futures commodity in varying volumes or lot sizes by members of a futures trading exchange as principals or agents for others wherein bids to purchase or offers to sell are made by said principals or agents for said particular commodity, said method comprising the steps of:
a. receiving in a central processor buyer bids and seller offers on a particular commodity from remote terminals,
b. storing in said central processor said bids and offers in the form of time, price and lot size of each of said received bids and offers,
c. comparing said received bids and offers and matching equal bids and offers on a first cone, first served basis according to the time of receiving said bids and offers thereby storing a trading system,
d. storing buy and sell constraints on each member of said exchange thereby forming a clearing system,
e. coupling said clearing system to said trading system for approving execution of a transaction only when said transaction falls within said predetermined buy and sell constraints,
f. executing the buy and sell transaction for a particular commodity for which said offer and bid have been matched and approved by said clearing system,
g. storing predetermined compliance criteria necessary to detect illegal trade practices thereby forming a compliance system,
h. coupling said compliance system to said trading system and said clearing system for detecting any illegal trade practices as indicated by said stored predetermined criteria, and
i. confirming the execution of an approved transaction immediately to both buyer and seller at the remote terminals whose bid and offer are matched.

24. A method as in claim 23 further comprising the steps of:
a. identifying by code at said remote terminals whether an agent or a principal has made said bid or offer, and
b. recording said identity code in said central processor whereby said agent or principal may be identified.

25. A method as in claim 24 further comprising the steps of:
a. prioritizing each received bid or offer on the basis of price, lot size and time received by said central processor, and

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b. receiving said prioritized bids and offers and displaying all bids in descending price order and all offers in ascending price order.

26. A method as in claim 25 further comprising the steps of:
a. providing a keyboard and a movable cursor on said remote terminal display,
b. modifying a bid or offer by moving said cursor to said displayed bid or offer, and
c. entering modifying data through said keyboard.

27. A method as in claim 24 further including the step of printing the execution of each transaction initiated by a particular remote terminal coupled to said central processor including date, time, lot size and price of said transaction and the name of the other member completing said transaction.

28. A system as in claim 24 wherein said step of detecting illegal trade practices comprises:
a. accessing said storage means in said central processor, and
b. displaying times of receipt of said bids and offers, the agent or principal making said trades, and the history of trading cf said agent or principal whereby illegal trade practices are made manifest.

29. A method as in claim 23 further comprising the steps of:
a. accessing said stored bids and offers for a particular commodity, and
b. determining the breadth of the market for that commodity by displaying the number of bids for any particular number of offers.

30. A method as in claim 23 further comprising the steps of:
a. accessing said stored bids and offers for a particular futures commodity, and
b. displaying bid or offer lot sizes, last sales price, daily price ranges, and volume of trades of said futures commodity occurring over any predetermined period of time.

31. A method as in claim 30 further including the step of displaying the variations in lot size, last sales price, daily price ranges, and volumes of trades of said commodity that occur between various ones of said predetermined periods of time.

32. A method as in claim 23 further comprising the steps of:
a. storing in at said central processor trading limits in dollar volume for any particular remote terminal, and
b. rejecting any bid or offer from any said remote terminal that exceeds the stored trading limits for each of said terminals.

33. A method as in claim 24 further comprising the steps of:
a. coupling a printer to said central processor, and

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b. selectively coupling said central processor storage to said printer for printing the volume of trading of any commodity over any particular period of time.

34. A method of storing an automated futures trading system for transacting a sale of a particular commodity in predetermined volumes or lot sizes by members of the trading system as principals or agents for others wherein bids to purchase or offers to sell said particular commodity are made by said principals or agents, said method comprising the steps of:
a. initiating and transmitting buyer's bids and seller's offers from remotely terminals,
b. determining whether said buyer's bids and seller's offers are valid,
c. comparing received valid bids with received valid offers to find a matching bid and offer on a first-come, first-served basis,
d. reviewing said valid bids and offers to detect illegal trading practices, and
e. notifying the remote terminals of a completed transaction when a matched bid and offer are found.

35. A method as in claim 34 further comprising the steps of:
a. forming a storage means in said central processor, and
b. storing said received bids and offers according to time, price and lot size for a particular commodity in said storage means.

36. A method as in claim 35 further comprising the steps of:
a. matching said bids and offers stored in said central processor on a priority basis where first received bids and first received offers are matched, and
b. completing said transaction of said matched bids and offers on a first received in time basis.

37. A method as in claim 34 further including the step of storing said received bids and offers in respective memory queues according to time, lot size, price and commodity.

38. A method as in claim 37 further comprising the step of reporting to said remote terminals last sales by time, lot size, price and commodity.

39. A method as in claim 37 further comprising the step of reporting to said remote terminals bids and offers as received by time, lot size, price and commodity.

40. A method as in claim 37 further comprising the step of notifying remote terminals of filled and unfilled orders.

41. A method as in claim 37 further comprising the step of maintaining a complete trading history of each trading system member.

42. A system as in claim 34 further comprising the steps of:
a. identifying each exchange member by an electronic code,
b. establishing limits of trade for each member, and
c. rejecting any proposed trade from a member that exceeds the established position limits.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO.   : 4,903,201

DATED   : Feb. 20, 1990

INVENTOR(S) : Susan W. Wagner

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

The title page should be deleted to appear as shown on the attached title page.

The sheets of drawing, consisting of Figs. 1 - 19, should be added as shown on the attached sheets.

Signed and Sealed this
Third Day of July, 1990

Attest:

HARRY F. MANBECK, JR.

Attesting Officer   *Commissioner of Patents and Trademarks*

United States Patent [19]

Wagner

[11] **Patent Number:** 4,903,201

[45] **Date of Patent:** Feb. 20, 1990

[54] **AUTOMATED FUTURES TRADING EXCHANGE**

[75] Inventor: Susan W. Wagner, Dallas, Tex.

[73] Assignee: World Energy Exchange Corporation, Dallas, Tex.

[21] Appl. No.: 548,319

[22] Filed: Nov. 3, 1983

[51] Int. Cl.⁴ G06F 15/30
[52] U.S. Cl. 364/408; 364/918.8; 364/900
[58] Field of Search 364/200, 900, 300, 408; 340/825.26; 235/375

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Primary Examiner—Jerry Smith
Assistant Examiner—Jon D. Grossman
Attorney, Agent, or Firm—Sigalos, Levine & Montgomery

[57] **ABSTRACT**

A computerized open outcry exchange system for transacting sales of a particular futures commodity contract by members of a futures trading exchange wherein bids to purchase or offers to sell the particular commodity contract are made by the members through remote terminals and the exchange computer automatically matches offers and bids to complete the transaction.

42 Claims, 14 Drawing Sheets

FIG. 1

REMOTE TERMINAL

10

22
TRADING
TERMINAL
AND
DISPLAY

30

28
PRINTER

18

26

34

24
STORAGE
ON-LINE

MODEM 32

36

MODEM 14

LIVE
SURVEILLANCE
SYSTEM

51

53

CENTRAL
TRADE
EXCHANGE

11

12
TRADING SYSTEM

42

CENTRAL PROCESSOR
13

- VALIDATION OF TERMINAL INPUT
- QUEUES ORDERS BY TIME, SIZE AND COMMODITY CONTRACT
- EXECUTES MATCHING BIDS & OFFERS & CLEARS TRADES SIMULTANEOUSLY
- REPORTS LAST SALE BY TIME, QUANTITY & PRICE BY COMMODITY
- REPORTS BIDS / OFFERS AS RECEIVED
- NOTIFIES TRADER OF FILLED / UNFILLED ORDERS
- REPORTS VARIOUS MARKET CONDITIONS / TRANSACTIONS
- MAINTAINS DETAILED TRADE HISTORY
- PROVIDES NECESSARY TRADE DATA FOR SETTLEMENT & COMPLIANCE
- SHOWS DIFFERENTIAL INFORMATION BY TYPE OF COMMODITY AND
  AND COMMODITY MONTH
- PROVIDES DISPLAYS FOR SIMULTANEOUSLY EXECUTING "SPREAD" TRADES
- PROVIDES REAL TIME SURVEILLANCE TO DETECT TRADING IRREGULARITIES

38
40

CLEARING
SYSTEM

46

44
COMPLIANCE
SYSTEM

48

50
INQUIRY /
CONTROL
TERMINAL

MODEM
16

42

MODEM 32

34

26

24
STORAGE
ON-LINE

20

TRADING
TERMINAL
AND
DISPLAY

30

28
PRINTER

COMPLIANCE 44

- TIME SORTED TRADE ACTIVITY
- TRADER / MEMBER REPORTS
- HISTORY
- SPECIAL PROGRAMS
- CROSS TRADES
  TRANSFERS OF POSITIONS
  TRADING IRREGULARITIES
- EARLY WARNING
- MEMBER FINANCIAL POSITIONS
- ANALYSIS OF RISK
- AUDIT CHECKLIST

CLEARING SYSTEM 38

- POSITIONS BY CLEARING MEMBERS
- MARGINS REQUIREMENTS
  ORIGINAL
  VARIATION
  OTHER
- DELIVERY NOTICE ALLOCATION AND TRACKING
  MARGIN
  RELEASE
- CLEARING REPORTS
  ELECTRONIC HARDCOPY
- ADMINISTRATION
  POSITION REPORTS
  TRANSFERS
  ACCOUNTING
  INVESTING
- DELIVERY
- CASH / PHYSICALS
  VERIFICATION

TRADING SYSTEM 12

- TRADE DATA
  TRADER / CLEARING MEMBER
  COMMODITY ACTIVITY
  TRADE MATCHING
- NEWS AND STATISTICS
- INTERIM POSITION REPORTS
  BY PERSONAL
  IDENTIFICATION NUMBER
- MARKET SURVEILLANCE
- COMMUNICATIONS / DELIVERY
  PRICE REPORTING
- AFTER HOURS ENTRIES
  TRANSFERS
  CORRECTIONS
- POSITION LIMIT CONTROL
- SECURITY

FIG. 2

FIG. 3

HOST —10

36

MODEM —32

34

PROCESSOR WITH MEMORY —112

116

ADDITIONAL MEMORY —114

108
KEYBOARD ENTRY —106

110

PRINTER OUTPUT —28

118
VIDEO DISPLAY

120

REMOTE TERMINAL (HARDWARE CONFIGURATION)

—18

FIG. 4

18

108 106
KEYED INPUT

110

122
ORDER MESSAGE

126

TERMINAL I.D. —124

REMOTE TERMINAL (OUTBOUND ORDER PROCESS)

• PRICE
• QUANTITY
• BUY / SELL
• COMMODITY CONTRACT
• ACCOUNT TYPE (PERSONAL, ETC.)

128

HOST —13

PENDING FILE (OPEN ORDERS) —130

132
DISPLAY

134
PRINT

12

FIG. 5
ORDER MESSAGE (INBOUND)

FIG. 6
• ORDER
• CANCELLATION
• EXECUTION
• MODIFICATION

FIG. 7

FIG. 8

FIG. 9

FIG. 10
REMOTE
TERMINAL

FIG. 11
CENTRAL
EXCHANGE
SYSTEM

FROM FIG. 10 — 400

RECEIVE AND TIME STAMP ORDER — 402, 406

408 — VALID ORDER AND TERMINAL ? — NO — 410

412 — WHY IS ORDER INVALID ?
COMMODITY / PRICE — 434
TERMINAL — 414

COMMODITY / PRICE ERROR — 436, 438

TERMINAL ERROR — 416, 418

SEND TO REMOTE TERMINAL — 426, 428

440 — YES

442 — MARKET OR COND. ORDER ? — CONDITIONAL — 444
452 — MARKET

454 — CAN MATCH OCCUR ? — NO — 456 — RESUBMIT — 458, 460
462 — YES

MATCH BUY/SELL ORDERS TIME STAMP — 450

PRICE REPORT (FIG. 15) — 446, 452, 454

FIG. 13 — 448

457

459 — TOTAL QUANTITY SATISFIED ? — NO — 461
463 — YES

PREPARE CONFIRM. MESSAGE FOR BUYER AND SELLER — 464, 466, 468

SEND CONFIRM. — 430
432
TO FIG. 12

PRINT — 420, 422

CONFIRM AUTH. — 424

MASTER TRADE FILE HOST
CREATE MASTER TRADE RECORD — 470, 472
MASTER TRADE FILE — 474

38 — CLEARING SYSTEM
44 — COMPLIANCE SYSTEM
51 — SURVEILLANCE SYSTEM

428

FIG. 12
REMOTE
TERMINAL

FROM
FIG. 11
432

476
RECEIVE
CONFIRM.
MESSAGE
478

480
PRINT
CONFIRM.
MESSAGE

482

484
DELETE
FROM
PENDING
FILE
486

488
PENDING
ORDER
FILE

490

492
TRADE
OR ORDER
?
494

496
TRADE
CONFIRM.

498

500
FILE
ORDER

502

UPDATE
ORDER
QUEUE
AND
DISPLAY

506
FILLED
ORDER
FILE
SCREEN
510

508
DISPLAY

NO
MY
ORDER
?
YES

512
PRINTED
COPY

END

FIG. 13
ORDER QUEUE – HOST

FROM FIG. 11

444 — 461

PRIORITIZE
ORDER BY
TIME, PRICE
AND QUANTITY — 530

532

534

561

428

TO
FIG. 11

AUTOMATIC
UPDATE
FILE (FIG. 14)

536

APPEND
CONDITION
CODE TO
ORDER — 538

540

548

SCAN OPEN
ORDER FILE
FOR MATCH

542

546

544

448

552

TO
FIG. 11

DELETE
ORDERS
FROM OPEN
ORDER FILE

YES

550

CAN
MATCH
OCCUR
?

NO

FIG. 14
AUTOMATIC
UPDATING
PROCESS – HOST

FROM FIG. 13

532

554

556

ORDER

ORDER
OR TRADE
?

TRADE

570

558

572

ASSIGN ORDER
UPDATE NO.
AND ADDRESS
FOR ALL
TERMINALS

574

560

ORDER
UPDATE
NUMBER
FILE

ASSIGN TRADE
UPDATE NO.
AND CROSS
REFERENCE

TO
FIG. 13

576

561

562

TO
FIG. 13

578

PREPARE
MESSAGE
FOR
DISTRIBUTION

PREPARE
MESSAGE
FOR
DISTRIBUTION — 564

580

582

566

568

SEND ORDER
UPDATE TO
TRADER
TERMINALS

428

TO
FIG. 11

SEND TRADE
UPDATE TO
TRADE
TERMINALS

FIG. 15
PRICE
REPORTING
PROCESS

FIG. 17

FIG. 19

BID   OFFER   LAST TRADE
1.5   1.4   1.42

BUY SELL

C.O.   H.O.   X   BUY   SELL   MKT

PRICE

DATA   I.D.

1	2	3
4	5	6
7	8	9
.	0	

ENTER

CANCEL

FIG. 18

MODEM   MODEM   TRADING SYSTEM

Evidence Appendix D

US005970479A

United States Patent [19]

Shepherd

[11] **Patent Number:** 5,970,479

[45] **Date of Patent:** Oct. 19, 1999

[54] **METHODS AND APPARATUS RELATING TO THE FORMULATION AND TRADING OF RISK MANAGEMENT CONTRACTS**

[75] Inventor: **Ian K. Shepherd**, Toorak, Australia

[73] Assignees: **Swychco Infrastructure Services Pty. Ltd.**, Melbourne, Australia; **Swychco Support Services Pty. Ltd.**, Sydney, Australia

[21] Appl. No.: **08/070,136**

[22] Filed: **May 28, 1993**

[30]   **Foreign Application Priority Data**

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Jun. 30, 1992 [AU] Australia .... PL 3216

[51] **Int. Cl.^{6}** **G06F 17/60**
[52] **U.S. Cl.** **705/37; 705/4**
[58] **Field of Search** 364/408; 705/4, 705/37

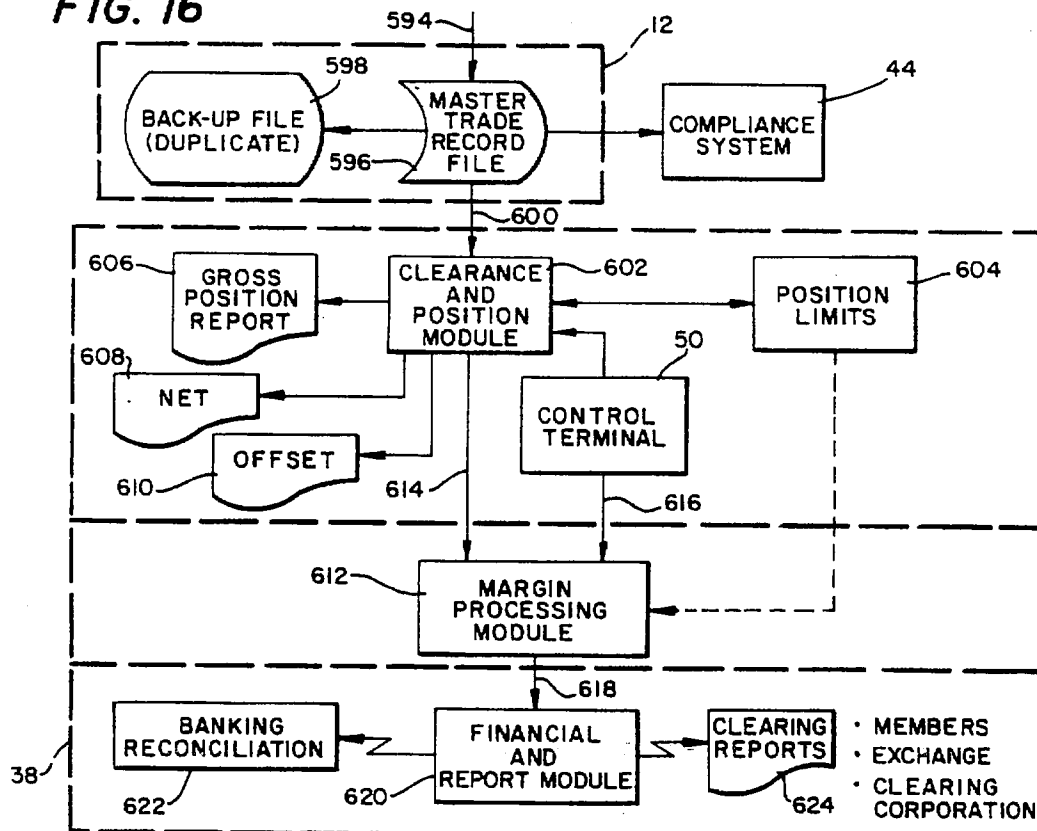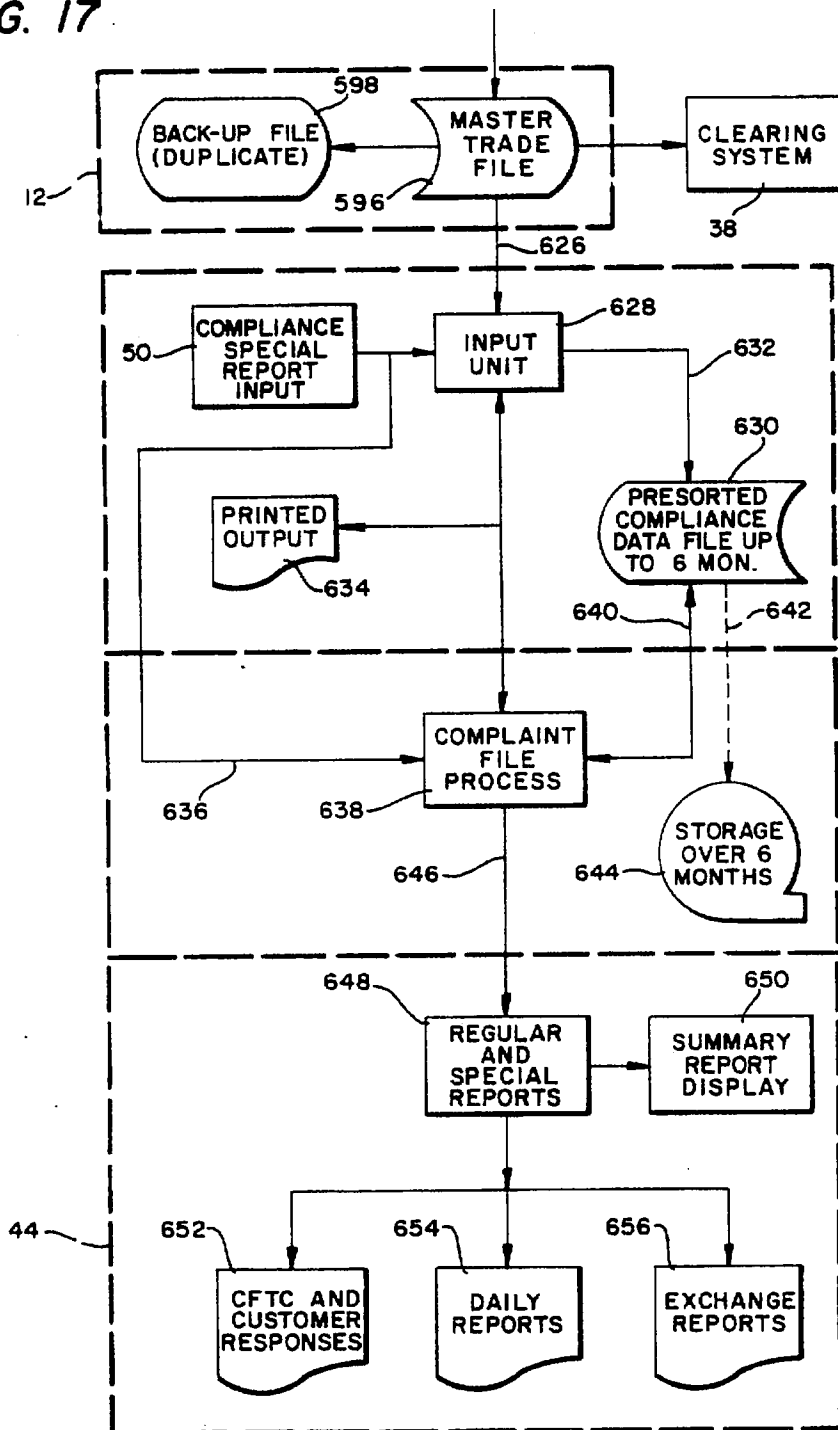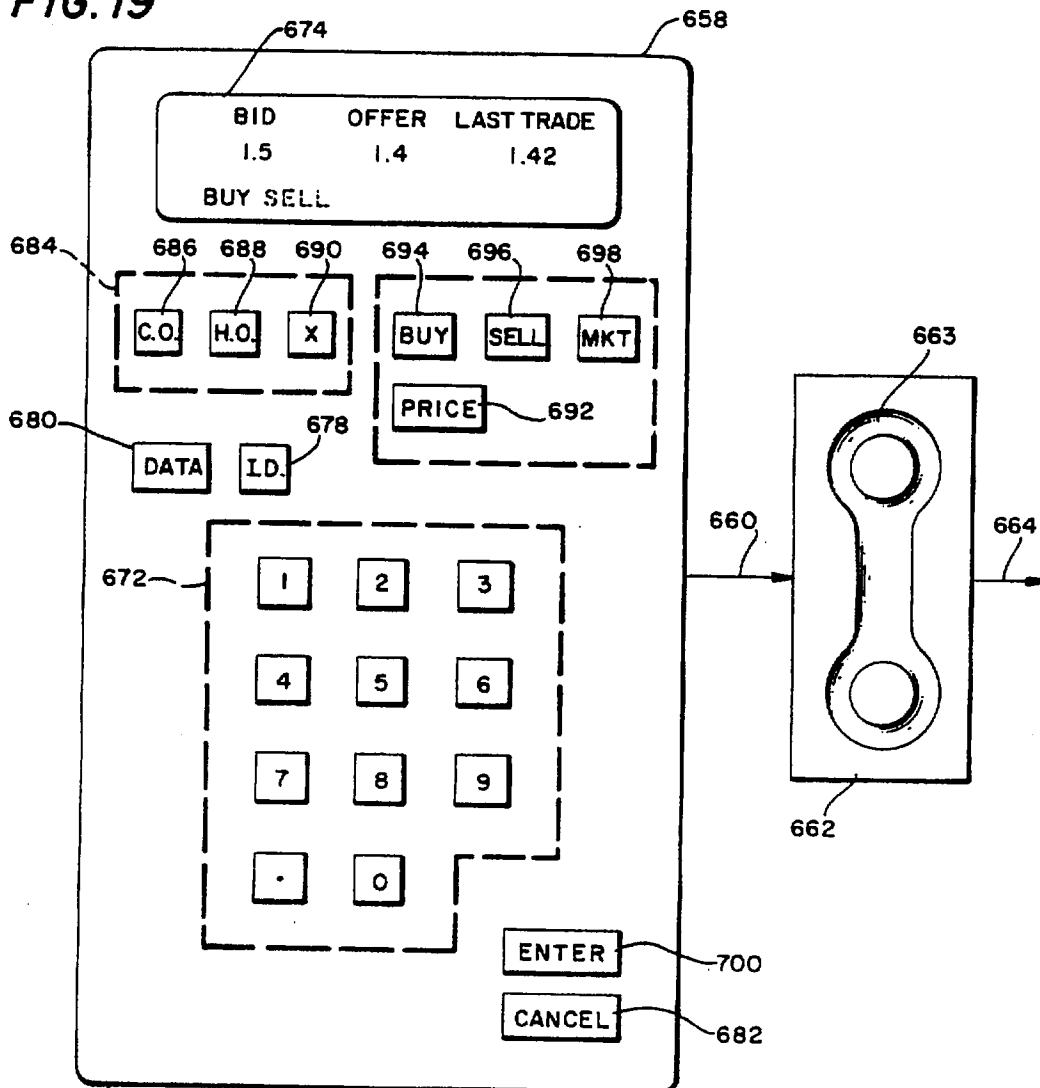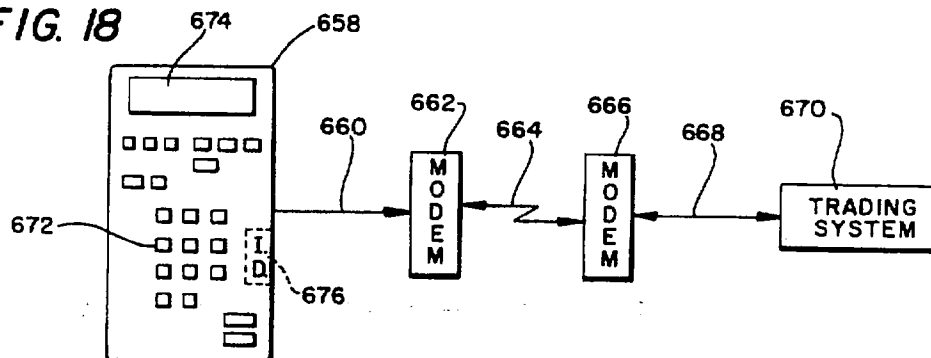[56]   **References Cited**

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Primary Examiner—Gail O. Hayes
Assistant Examiner—Barton L. Bainbridge
Attorney, Agent, or Firm—Sterne, Kessler, Goldstein & Fox P.L.L.C.

[57]   **ABSTRACT**

Methods and apparatus which deal with the management of risk relating to specified, yet unknown, future events are disclosed.

'Sponsor' stakeholders specify a particular product relating to an event or phenomenon for which there is a range of possible future outcomes.

'Ordering' stakeholders then offer contracts relating to the predetermined phenomenon and corresponding range of outcomes. The offered contracts specify an entitlement or (pay-off) at the future time of maturity for each outcome, and a consideration (or premium) payable, in exchange, to a 'counter-party' stakeholder.

Independently of the offered contracts, the 'counter-party' stakeholders input data as to their view of the likelihood of occurrence of each outcome in the predetermined range into the future, or specifically at the predetermined date of maturity.

Each offered contract is priced by calculating counter-party premiums from the registered data, and a match attempted by a comparison of the offered premium with the calculated premiums.

Matched contracts can be further traded until maturity, and at-maturity processing handles the exchange of entitlement as between the matched parties to the contract.

39 Claims, 101 Drawing Sheets

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11

10

18

Application
Promoters

Miscellaneous
Parties

12

Product
Sponsors

20

17

Consideration/
Entitlement
Transfer Entities

Processing Units

13

Product
Ordering Parties

16

25

14

Regulators

15

Potential Product
Counterparties

Counterparty
Guarantors

FIG. 1

Fig. 2

Fig. 2b

INVENTCO, 10

INVENTCO SYSTEM #N

INVENTCO SYSTEM #2

INVENTCO SYSTEM #1

M-INVENTCO

I-INVENTCO

AXSCO

VIRPRO

Fig. 3

M - INVENTCO

'MARKETS' COLLECTION #N

'MARKETS' COLLECTION #2

'MARKETS' COLLECTION #1 (CONTRACT APPS)

CONTRACT APP #M

CONTRACT APP #1

Fig. 4

CONTRACT APP #M

PROCESS #9

PROCESS #2

PROCESS #1

Fig. 5

EXAMPLE I

Contract Settlement
95.02.11.10.00.00.00
(Illustrated)

Contract Valuation
94.11.15.10.00.00.00
(Illustrated)

Contract Maturity
95.02.10.17.00.00.00
(Illustrated)

Contract Valuation
93.07.01.16.00.00.00
(Illustrated)

Order/Contract Confirmation
(between Denisons and Demdata)
93.07.01.14.38.50.00

Application Specification
92.02.10.17.00.00.00
(Illustrated)

Product Specification
92.02.10.17.00.00.00
(Illustrated)

Order Matching
93.07.01.14.29.10.00

Order Specification Pricing
(by Demdata)
93.07.01.14.26.40.00
(Illustrated)

Primary Order Specification
(by Denisons)
93.07.01.14.25.30.00
(Illustrated)

Potential Counterparty
Product Pricing
Specifications
93.07.01.14.00.00.00

Fig. 6

EXAMPLE II

Fig. 7

Contract Settlement
96.11.02.11.00.00.00

Contract Valuation
94.11.22.10.00.00.00
(Illustrated)

Contract Maturity
96.11.01.17.00.00.00
(Illustrated)

Contract Valuation
94.06.01.16.00.00.00
(Illustrated)

Order/Contract Confirmation
(between Basstel Co. and Tasnet)
94.06.01.14.38.50.00

Application Specification
93.11.01.17.00.00.00
(Illustrated)

Product Specification
93.11.01.17.00.00.00
(Illustrated)

Order Matching
94.06.01.14.29.10.00

Order Specification Pricing
(by Tasnet and Aarcom)
94.06.01.14.26.40.00
(Illustrated)

Primary Order Specification
(by Basstel Co.)
94.06.01.14.25.30.00
(Illustrated)

Potential Counterparty
Product Pricing
Specifications
94.06.01.14.00.00.00

610 —
```
    ( START )
```

625 —
```
Order sequence management
    /Order authorisation
         (Fig 9)
```
← Ⓐ

640 —
```
  Order matching
     (Fig 11)
```

650 —
```
  Matched order
   confirmation
     (Fig 16)
```

Fig. 8

From "START" (610) or "A"

1010 — Determine which file to process

1020 — New orders ?

PORD_NEW

1040

YES

NO

PORD_QUEUE

1070

Load new order

1030

Load queued order

1060

Order authorisation (Fig 10)

1050

"Order Matching" (640)

Fig. 9

From "Load New Order" (1030)

1100 — Assign unique identification to OID

PPRODUCT

1120

1110 — Load product details and set PMAT, PCUR, PNCUR, PC/ED, PMIN, PMAX, PSTEP

1130 — Verify ?

NO

1140 — Reject order

1150 — PORD_REJ

HISTORY

1152

YES

1160 — Report to ordering party

ADMIN

1162

"Order Matching" (640)

A

Fig. 10

From "Order Sequence Management" (625)

1200 — Retention time expired ?

YES → Reject order — 1210

→ PORD_REJ — 1220

→ HISTORY — 1222

NO

1240 — Get product counterparty short list (Fig 12)

1250 — Calculate counterparty bid process (Fig 13)

Report to ordering party — 1230 → A

ADMIN — 1232

1255 — Quote order ?

YES → Select counterparty bid prices from short list and queue order — 1256

→ PORD_QUEUE — 1257

NO

1260 — Match with potential counterparty from short list (Fig 15)

1261 — Matched order ?

NO → A

YES

"Matched Order Confirmation" (650)

Fig. 11

From "Retention time expired?" (1200)

1300 — Empty potential product counterparty short list

1310 — Get available product counterparties using BID, PID and set SID

PDEAL_LIST
1320

1330 — Next available counterparty ? — NO → "Calculate Product Counterparty Bids" (1250)

YES

1365 — (OANON and MANUAL(SID)) or (OMANUAL and ANON(SID)) ? — YES

NO

1335 — Determine the defined circumstances identification for the current order and store in DCID

PSEL_DC
1336

1340 — Select pricing parameters using SID, PID, DCID

PSEL_PRICE
1350

Pricing and rates offered by counterparty ? — NO / YES

1360

Add counterparty to short list and set PRICEFUNC(SID), CR(SID), DR(SID), C-CXCHANG(SID), C-NCXCHANG(SID), C-C/EXCHANG(SID), E-CXCHANG(SID), E-NCXCHANG(SID), E-C/EXCHANG(SID), ANON(SID), MANUAL(SID)

1370

Fig. 12

From "Get Product Counterparty Short List" (1240)

1400 — For each counterparty in short list

1410 — Next available counterparty ? — NO → (1255)

YES

1420 — PRICE(SID) = CALC_FUNC(PRICEFUNC(SID), PAYFUNC, PAYPARAM) (Fig 14)

1430 — MT_DAY = PMAT - CUR_DATE

1440 — I = 1 DIV = 1.0

1450 — I <= MT_DAY ? — NO

YES

1460 — DIV = DIV * (1.0 + ((DR(SID)/100)/365)) I = I + 1

1470 — PRICE(SID) = PRICE(SID) / DIV

1480 — PRICE(SID) = PRICE(SID) + ((CR(SID)/100) * PRICE(SID))

Fig. 13

(From 1420)

1490 — INDEX = PMIN
PRICE(SID) = 0

1500 — INDEX <= PMAX
?

NO

PRICE(SID) = PRICE(SID) *
E-CXCHANG(SID) *
E-NCXCHANG(SID) *
E-C/EXCHANG(SID)

1510

(Block 1430)

YES

1520 — P1 = PRICEFUNC(INDEX)

1530 — P2 = PAYFUNC(INDEX)

PRICE(SID) = PRICE(SID) + (P1 * P2)

1540

INDEX = INDEX + PSTEP

1550

Fig. 14

(From 1260)

1560 — Any potential counterparties in short list ? — NO

YES

1570 — Pick lowest priced counterparty and store BPRICE and SID

1600 — PSEL_LIMIT

1580 — BPRICE > MAXCONSID ? — YES

1612 — No match possible with current counterparty short list (SID = 0)

NO

1590 — Select counterparty limit details and set CEL2(SID), CEL3(SID), CEL4(SID), CEL5(SID), ELL1(SID), ELL2(SID), ELL3(SID), ELL4(SID), ELL5(SID), MC(SID), MCC(SID), CAL2(SID), ALL1(SID), ALL2(SID), ELFUNC(SID), EVFUNC(SID), EVL1(SID)

1602 — EL(SID) = CALC_FUNC(ELFUNC(SID), PAYFUNC, PAYPARAM)
AL(SID) = (PAYFUNC, PAYPARAM)
EV(SID) = CALC_FUNC(EVFUNC(SID), PAYFUNC, PAYPARAM)

1604 — Determine what part of the order will not violate any counterparty limits

1616 — ORD_QUEUE

1606 — Any part matched ? — NO — Remove counterparty from short list — 1608

YES

1610 — SID set to identification of matching counterparty

1614 — Queue part of order un-matched

"Matched Order?" (1228)

Fig. 15

From "Order Matching"(640)

1620 — ◇ OMANUAL or MANUAL(SID) ? — *YES* → 1621 — Send manual authorisation requests ← ADMIN 1622

1624 — *NO*

1625 — PAYACC SHADOW ← 1624 Make consideration "payment" ← *NO* — 1623 ◇ Any rejections ? — *YES* → PORD_REJ 1628

1626 — ◇ Payment OK ? — *NO* → 1627 Reject order → HISTORY 1629

PSEL_LIMIT 1631

YES

1630 Update matching counterparty's current accumulated expected and absolute losses

1632 — OPRICE = PRICE(SID) SPRICE = SID

1636 — PORD_CONF ← Order matched and confirmed 1634

HISTORY 1635 ←

1639 ADMIN → Report to ordering party, matching counterparty, guarantor, regulator, application promoter 1638

1641 ADMIN → Report to ordering party 1640

A

Fig. 16

EXAMPLE III

Contract Settlement
94.06.04.05.00.00.00

Contract Valuation
94.01.01.17.00.00.00
(Illustrated)

Contract Maturity
94.06.03.17.00.00.00
(Illustrated)

Secondary Order Specification
(by Shearer & Associates)
93.06.06.08.00.00.00
(Illustrated)

Contract Valuation for
Shearer and Associates
93.06.06.09.00.00.00
(Illustrated)

Contract Valuation
93.01.01.23.00.00.00
(Illustrated)

Order/Contract Confirmation
(between Abbotts & Taylor and
Abrahamsons)
93.01.01.17.38.11.00

Application
Specification
91.06.03.17.00.00.00
(Illustrated)

Product
Specification
91.06.03.17.00.00.00
(Illustrated)

Product Order
Matching
93.01.01.17.38.07.00

Order Specification Pricing and
Contract Specification Limits
(by Abrahamsons and Carpenters Inc.)
93.01.01.17.38.02.00
(Illustrated)

Primary Order
Specification
(by Abbotts & Taylor)
93.01.01.17.37.06.00
(Illustrated)

Potential Counterparty
Product Pricing
Specifications
93.01.01.17.00.00.00

Fig. 17

310

START

ADMIN TRANS

320

PRODUCT TRANS

327

DEAL LIST TRANS

332

SEL PRICE TRANS

341

TRADE PRICE TRANS

347

SEL LIMIT TRANS

354

TRADE LIMIT TRANS

361

Transaction processing and file updates

390

ADMIN

410

PRODUCT

430

DEAL LIST

460

SEL PRICE

470

TRADE PRICE

480

SEL LIMIT

490

TRADE LIMIT

500

INFO

510

HISTORY

520

Fig. 18

1200 — START

A →

1210 — Order File Selection

PORD NEW 1220

PPRODUCT 1230

ADMIN 1240

1250 — Order sequence management /Order authorisation

PORD QUEUE 1260

PORD REJ 1270

HISTORY 1280

PDEAL LIST 1290

PSEL PRICE 1300

PSEL LIMIT 1310

PSEL DC 1320

ADMIN 1330

1340 — Order matching

PORD QUEUE 1350

PORD REJ 1360

HISTORY 1370

ADMIN 1380

1390 — Matched order confirmation

PORD REJ 1400

PSEL LIMIT 1410

PAY ACC SHADOW 1420

PORD CONF 1430

A

HISTORY 1440

Fig. 19

1955 — START

B → 1956

Order File Selection

SORD NEW 1957

SPRODUCT 1958

ADMIN 1959

1960

Order sequence management /Order authorisation

SORD QUEUE 1961

SORD REJ 1962

HISTORY 1963

INTREG 1964

SDEAL LIST 1965

ADMIN 1966

1967

Order matching

SORD QUEUE 1968

SORD REJ 1969

HISTORY 1970

ADMIN 1971

1972

Matched order confirmation

B

SORD REJ 1973

PAYACC SHADOW 1974

SORD CONF 1975

HISTORY 1976

Fig. 20

3000 — START

A →

3010 — Order File Selection

DPORD NEW
3020

DPPRODUCT
3030

ADMIN
3040

3050 — Order sequence management /Order authorisation

DPORD QUEUE
3060

DPORD REJ
3070

HISTORY
3080

DPDEAL LIST
3090

DPSEL PRICE
3100

DPSEL LIMIT
3110

DPSEL DC
3120

ADMIN
3130

3140 — Order matching

PORD QUEUE
3150

DPORD REJ
3160

HISTORY
3170

ADMIN
3180

HISTORY
3250

3190 — Matched order confirmation

A

DPORD REJ
3200

DPSEL LIMIT
3210

PAYACC SHADOW
3220

DPORD CONF
3230

DP MSTR
3240

Fig. 21

4000 — (START)

B →

4010 — Order File Selection

DSORD NEW
4020

DSPRODUCT
4030

ADMIN
4040

4050 — Order sequence management /Order authorisation

DSORD QUEUE
4060

DSORD REJ
4070

HISTORY
4080

INTREG
4090

DSDEAL LIST
4100

ADMIN
4110

4120 — Order matching

DSORD QUEUE
4130

DSORD REJ
4140

HISTORY
4150

ADMIN
4160

HISTORY
4210

4170 — Matched order confirmation

B

DSORD REJ
4180

PAYACC SHADOW
4190

DSORD CONF
4200

DSMSTR
4220

Fig. 22

BILAT
OBLIG NET
4640

DP/DS MSTR
4650

MULTILAT
OBLIG NET
4500

MAT PROD
VALUES
4510

MULTLAT
PYMTS NET
4630

ORD CONF
4520

BILAT
PYMTS NET
4620

PROCESS 6

4660

PAYACC
SHADOW
4530

COLLAT
4610

PAYACC FINAL
4540

VALUATION
4600

HISTORY
4550

INFO
4590

TAX/SUB
4580

INTREG
4570

ADMIN
4560

Fig. 23

5010 —— START

5022 —— Applic "Start-of day" ?

NO

YES

ADMIN

5030 —

5040 —

Receipt of previous days matured contract actual product event value details

Product Sponsors

5080 —

HISTORY

5050 —

MAT PROD VALUES

5060 —

INFO

5070 —

Fig. 24

Fig. 25

5400 — (START)

5410 — ◇ Matured contract processing required ? — *NO*

YES

MAT PROD VALUES
5420

ADMIN
5430

INTREG
5440

COLLAT
5450

CREDIT MGMT
5460

BILAT OBLIG NET
5470

MULTILAT OBLIG NET
5480

Contract maturity management
5490

HISTORY
5500

TAX/SUB
5510

PAYACC SHADOW
5520

INFO
5530

Fig. 26

Fig 27

Fig. 28

Fig. 29

6400

START

6420

Contract
revaluation required
?

NO

YES

ADMIN

6430

INFO

6440

INTREG

6450

6460

Contract valuation

HISTORY

6470

Fig. 30

Fig. 31

Fig. 32

Fig. 33

7600 — START

7610 — Multilat oblig netting update required ?

NO

YES

7620 — ADMIN

7630 — INTREG

7640 — MULTILAT OBLIG NET

7650 — PAYACC SHADOW

7660 — Multilateral obligations netting

7670 — HISTORY

7680 — INFO

Fig. 34

Fig. 35

8000 — START

8010 — Multilat payments netting update required ? — NO

YES

ADMIN

8020

PAYACC SHADOW

8030

MULTILAT PYMTS NET

8040

8060 — Multilateral payments netting

HISTORY

8070

INFO

8080

Fig. 36

Fig. 37

Fig. 38

8950

START

8960

Specialist system shared access required ?

NO

YES

9000

ADMIN

8970

SSA TRANS

8980

HISTORY

8990

Specialist system shared access transactions processing

SSA

9010

INFO

9020

Fig. 39

Fig. 40

FIG. 41

APPLICATION SPECIFICATION

Part A

Application ID:	100	Applicable Product ID's
Application Promoter:	Demdata Inc	Preferred/preferential dealing?
Primary Application Use:	Defect liability management	Pre or Post Tax Matching?
Feasible Counterparty No's:	Single counterparty	Tax deduction/subsidy at source?
Public/private use?:	Public	Degree of Trading transparency:
Acceptable comms mediums:	Computer to computer	Secondary trading allowed?
Retail/Wholesale Use:	Wholesale	Derivative trading allowed?
Pricing and Matching	Minimize consideration	Deferred Order Submissions possible?
Process:	payment under an EV/CE	Partial Matches possible?
	regime	Settlement terms:
		- considerations
		- entitlements
Contract Revaluation Frequency:	Daily	Manual Approvals possible?
		Ordering Party consideration credit?
Ordering Parties allowed negative		Collateralisation Payments?
contract payoffs?	No	- Counterparties
Application Access Limitations:	Nil	- Ordering Parties
		Bilateral Obligations Netting?
		Bilateral Payments Netting?
		Multilateral Obligations Netting?
		Multilateral Payments Netting?

Netting Details (if applicable)		Collateralisation Details (if applicable)	
Applicable Discount Rate:	Not Applicable	Trustee:	Not Applicable
Obligation Netting trigger:	Not Applicable		
Min required settlements:	Not Applicable		

Ordering Party Consideration-Credit Options

Counterparty provided?		--Participating Basis:	--Ord. Party-guarantor protected
			--Unprotected
		--Non-Participating Basis:	--Ord. Party-guarantor protected
			--Unprotected
Ordering Party Guarantor provided?		--Participating Basis:	
		--Non-Participating Basis:	

FIG. 41 CONT.

AS AT	92.02.10.17.00.00.00

1200-1250	Application Access Limitations
Unavailable	
Pretax	Contract Ordering Parties:
Not Applicable	Nil
Nil	
No	
No	
Yes	
Yes	Contract Counterparties:
	Nil
Immediate	
Immediate	
No	
No	
	Counterparty Guarantors:
No	Nil
No	
No	
No	Others:
No	Nil
No	

Valuation Details	Consideration Credit Details
Applicable Discount Rate:	Ordering Party Guarantor:
10% p.a.	Not Applicable

	1	2	3	4	Key: Counterparty: 1.Interest Rate(% p.a.) 2.Participation rate(%)
-Participating					
-Non-Participating					
-Participating					Order Party-guarantor 1.Interest Rate(% p.a.) 2.Participation rate(%)
-Non-Participating					

FIG. 42

PRODUCT SPECIFICATION

PRODUCT ID: 1210

Product Summary

Application ID: 100   Product Sponsor:

Product Specification

Market: Factory Output Quality Indices

Sub-market: 64-bit Microprocessor Fault Tolerance Index

Market type: Spot

Establishment date/time: 95.02.10.17.00.00.00

Maturity date/time: 95.02.10.17.00.00.00

Minimum Product Definition Value: 0.00   Maximum Product Definition Value:

Product Details

Conditional Payoff Dimensions ID: One		Actual/Perceived Market Identifier:
Market Phenomena Class Identifier: Fault Tolerance Index		Specific Phenomenon:
Elemental/compound sub-market Identifier --		Sub-market Phenomenon Class Identifier:
Future Period Date/time Identifier: At Contract Maturity date/time		Event Type Identifier:
Minimum Product Definition Value: 0		Maximum Product Definition Value:
Product Establishment Date/time: 92.02.10.17.00.00.00		Product Maturity Date/time:
Consideration denomination of Product: Money		Currency type denomination of Product(if applic)
Entitlement denom. of Product: Exclusive Production Warrants (XPW's)		

FIG. 42 CONT.

AS AT   92.02.10.17.00.00.00

Demdata Inc

Consideration denom.type: Money

Entitlement denom. type : Exclusive Production Warrants(XPW's)

Currency type (if applic.) :   Com Bnk Dep.

National currency type (if applic.):   AUD

100   Product Step Value: 02

Actual   Elemental/compound
Dept of Defense Reject Summaries   Market Identifier:Single Market
--

Spot Value
100   Product Step Value: 02
95.02.10.17.00.00.00
        Com Bnk Dep.   National currency type denomination
                                 of Product (if applic.)   AUD

FIG. 43

PRIMARY ORDER SPECIFICATION   AS AT:

| Ordering Party: | Denisons |
| Own reference: | 5096263 |

| Application ID: | 100 |

Product:	(ID:	1210	)
Market	Factory Output Quality Indices		
Sub-Market	64B.M.F.T.Index	Market Type	Spot
Estab.date/time	92.02.10.17.00.00.00		
Maturity date/time	95.02.10.17.00.00.00		

Application Promoter	Demdata Inc
Product Sponsor	Demdata Inc
Counterparty-guarantor	--
Regulator	Dept of Defense

"X"Value: 5

X Range Value	1	2	3	4	5	6
Alpha (X)	0	22	48	94	100	
Alpha (X)	0	21.040	21.040	161.900	161.900	

G	1	6
a	2	11
m	3	3
m	4	11
a	5	

ORDER SUPPORT DETAILS

Communications medium:	Computer-to-computer
Consideration Credit sought?	No
Desired Form of Consideration Credit(if appl.)	Not Applicable
Counterparty Collateralisation payments required?	No
Preparedness to make 'own' collateralisation payments(if applicable)?	Not Applicable
Applicable Marginal Tax rate(if applicable)?	
-Consideration:	Not Applicable
-Entitlements:	Not Applicable
Netting System Participation?	
-Bilateral Obligations netting?(if applic.)	No
-Bilateral Payments netting?(if applic.)	No
-Multilateral Obligations netting?(if applic.)	No
-Multilateral Payments netting?(if applic.)	No

FIG. 43 CONT.

93.07.01.14.25.30.00

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Consideration type	Money	Money	N.A.
Entitlement type	XPW's	N.A.	XPW's
Currency type(if applic.)	Com Bnk Dep	Com Bnk Dep	Com Bnk Dep
National Curr.type(if applic.)	AUD	AUD	AUD
Max.Consid.Amount	N.A.	32.000	As below

Pricing and Matching Process
         Minimize consideration payment under an EV/CE regime

SPECIAL
DEAL TYPE: Not Applicable

Partial Matches desired? No	Unacceptable Counterparties and Other Stakeholders
Manual Approval of Matches desired? No	
Desired degree of trading transparency	Not Applicable
(if applicable) Not Applicable	
Applicable Consid./Entitlement Transfer Entity	
Account details: ABC Banking Corp	
Operating A/c 1-1-502026-617634-1(and 2)	
Desired date/time of Order Submission: Immediate	
Desired Order retention perid: 00.00.01.00.00.00	
Desired Max.time for counterparty	
manual order approval(if applic.): Not Applicable	
Preferred/Preferential Dealing:	
Not Applicable	

FIG. 44

ORDER SPECIFICATION PRICING	By : Demdata Inc

COUNTERPARTY PRICING SPECIFICATION	Application ID: ProductID:

Defined Circumstances ID 14	Commission Rate: 1.10%	Discount Rate:

Feasible Product Definition Values	Gross Contingent Entitlement Amounts	Op/CP C/Credit Adjust	Net Contingent Entitlement Amounts	Component Product Prices
0-20	0.000	0.00	0.000	0.149588
22-48	(21.040)	0.00	(21.040)	0.666056
50	(27.160)	0.00	(27.160)	0.020458
52	(33.290)	0.00	(33.290)	0.020396
54	(39.410)	0.00	(39.410)	0.020328
56	(45.540)	0.00	(45.540)	0.020258
58	(51.660)	0.00	(51.660)	0.020180
60	(57.790)	0.00	(57.790)	0.008007
62	(63.910)	0.00	(63.910)	0.007927
64	(70.030)	0.00	(70.030)	0.007844
66	(76.160)	0.00	(76.160)	0.007758
68	(82.280)	0.00	(82.280)	0.007669
70	(88.410)	0.00	(88.410)	0.007578
72	(94.530)	0.00	(94.530)	0.007484
74	(100.660)	0.00	(100.660)	0.007387
76	(106.780)	0.00	(106.780)	0.007288
78	(112.910)	0.00	(112.910)	0.007197
80	(119.030)	0.00	(119.030)	0.007084
82	(125.150)	0.00	(125.150)	0.006979
84	(131.280)	0.00	(131.280)	0.006872
86	(137.400)	0.00	(137.400)	0.006763
88	(143.530)	0.00	(143.530)	0.006653
90	(149.650)	0.00	(149.650)	0.006542
92	(155.780)	0.00	(155.780)	0.006429
94-100	(161.900)	0.00	(161.900)	0.019515
				1.06023

x Applic. Entitle. Exchange Rates   (................)   (.................)   (.................)
= Base contract bid price(in Product Denom. terms)   C/E   Currency   Nat Curr.
Net Present Value (at........   9.90% p.a.   ...)
+ Flat Commission (..........   1.10%   ...)
= Contract Bid Price (in Product Denom. terms)
x Applic. Consid. Exchange Rates   (................)   (.................)   (.................)
= Contract Bid Price (in OP requested terms)(if applic.)   C/E   Currency   Nat Curr.
  Implied Base 'Margin' on Contract
+ Exchange Rate and Consideration Investment Margin
= Implied Contract Value (to CP)

FIG. 44 CONT.

AS AT 93.07.01.14.26.40.00

| 100 1210 | Consideration Exchange Rates (if applic) | :C/E .....-..... | Currency.....-..... | Nat.Curr.....-..... |

| 9.90% p.a. | Entitlement Exchange Rates: (if applic) | :C/E .....-..... | Currency.....-..... | Nat.Curr.....-..... |

Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurence	Net Contingent Entitlement (Valuation) Amts.	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amounts
0.000	0.195375	0.000	0.000	
(14.014)	0.620536	(13.056)	(13.056)	
(0.555)	0.008358	(0.227)	(0.227)	
(0.678)	0.008295	(0.276)	(0.276)	
(0.801)	0.008228	(0.324)	(0.324)	
(0.923)	0.008158	(0.372)	(0.372)	
(1.043)	0.008084	(0.418)	(0.418)	
(0.463)	0.008007	(0.463)	(0.463)	
(0.507)	0.007927	(0.507)	(0.507)	
(0.549)	0.007844	(0.549)	(0.549)	
(0.591)	0.007758	(0.591)	(0.591)	
(0.631	0.007669	(0.631	(0.631	
(0.670)	0.007578	(0.670)	(0.670)	
(0.707)	0.007484	(0.707)	(0.707)	
(0.744)	0.007387	(0.744)	(0.744)	
(0.778)	0.007288	(0.778)	(0.778)	
(0.811)	0.007187	(0.811)	(0.811)	
(0.843)	0.007084	(0.843)	(0.843)	
(0.873)	0.006979	(0.873)	(0.873)	
(0.902)	0.006872	(0.902)	(0.902)	
(0.929)	0.006763	(0.929)	(0.929)	
(0.955)	0.006653	(0.955)	(0.955)	
(0.979)	0.006542	(0.979)	(0.979)	
(1.002)	0.006429	(1.002)	(1.002)	
(3.159)	0.019515	(3.159)	(3.159)	(161.900)
(34.110)	1.0000	(30.770)	(30.770)	(161.900)

| 34.110 |
| 29.220 |
| 0.320 |
| 29.540 |

| 26.360 |

| 29.540 |

3.180
3.180

FIG. 45

CONTRACT VALUATION

C O N T R A C T   S U M M A R Y   (G R A P H I C A L)

Ordering Party:	Denisons
Counterparty:	Demdata Inc

Application ID:	100
O.P.Own reference:	5096263

Product: (ID:	1210)
Market	Factory Output Quality Indices
Sub-Market 648.M.F.T.Index	Market Type Spot
Estab.date/time	92.02.10.17.00.00.00
Maturity date/time	95.02.10.17.00.00.00

Application Promoter	Demdata Inc
Product Sponsor	Demdata Inc
Counterparty-guarantor	--
Regulator	Dept of Defense

Valuations as at	93.07.01.16.00.00.00	
	F.P.V's	Contract
Expected Value	38	29.330
Std. Deviation	4 .	6.213

Order ID (if app.)	85746235
Conf.date/time (if app.)	93.07.01.14.38.50.00
Contract/Product context:	1 of 1

Special Deal Type:	Not Applicable

XPW's

Feasible Product Values (F.P.V's)

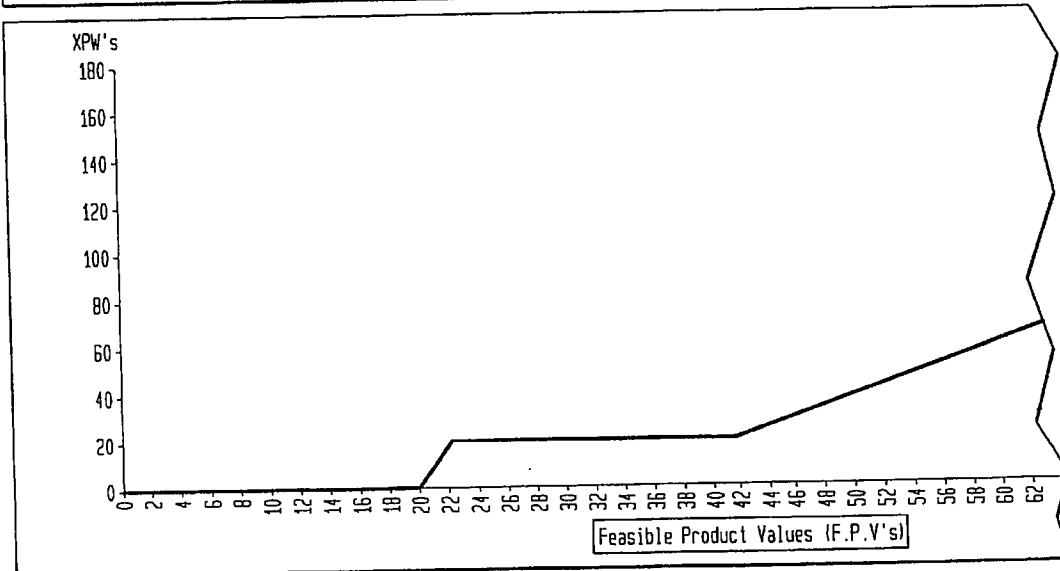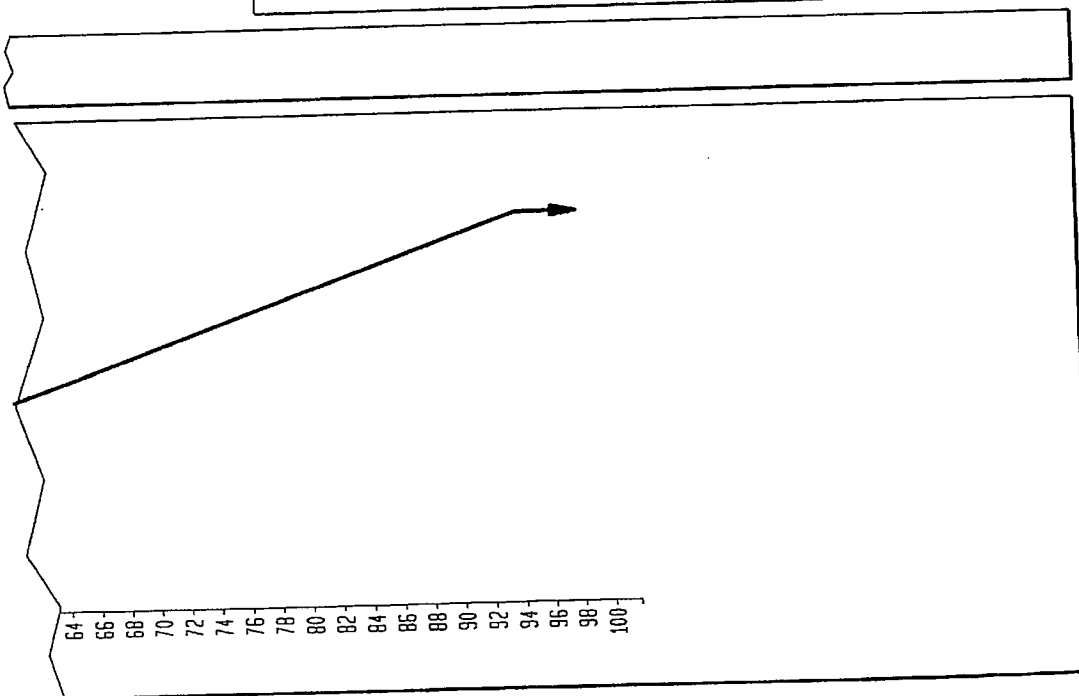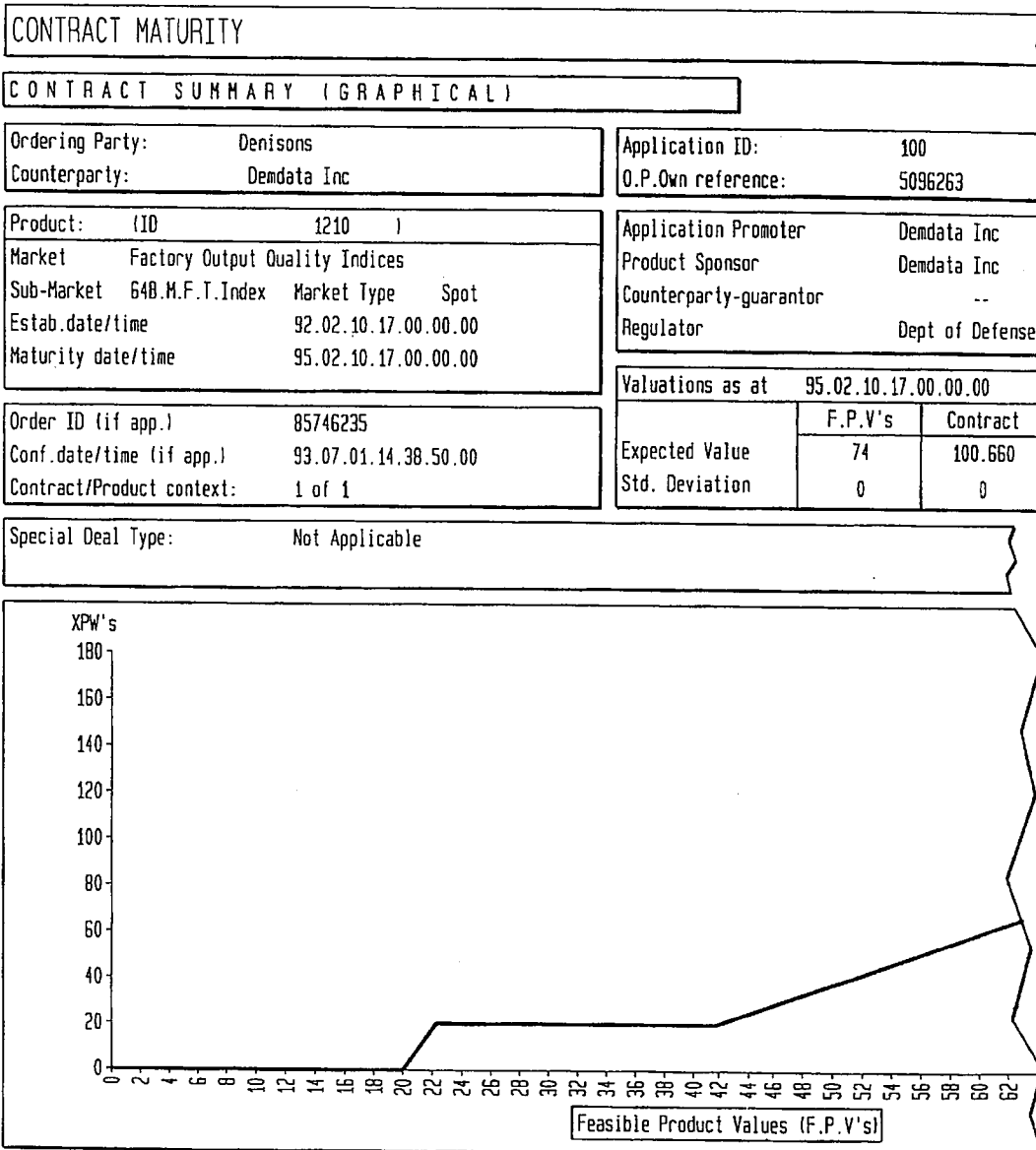*FIG. 45 CONT.*

AS AT 93.07.01.16.00.00.00   Report for: Denisons

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money/XPW's	Money	XPW's
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	N.A.
National Curr.type(if applic.)	AUD	AUD	N.A.
Amount	N.A.	29.540	As below

Pricing and Matching Process:	Minimize consideration payment under an EV/CE regime

FIG. 46

CONTRACT VALUATION

C O N T R A C T S U M M A R Y (G R A P H I C A L)

Ordering Party:	Denisons
Counterparty:	Demdata Inc

Application ID:		100
C.P. Own reference:		MD2-D

Product:	(ID 1210)
Market	Factory Output Quality Indices
Sub-Market	648.M.F.T.Index Market Type Spot
Estab.date/time	92.02.10.17.00.00.00
Maturity date/time	95.02.10.17.00.00.00

Application Promoter	Demdata Inc
Product Sponsor	Demdata Inc
Counterparty-guarantor	--
Regulator	Dept of Defense

Order ID (if app.)	85746235
Conf.date/time (if app.)	93.07.01.14.38.50.00
Contract/Product context:	1 of 1

Valuations as at	93.07.01.16.00.00.00	
	F.P.V's	Contract
Expected Value	38	(29.330)
Std. Deviation	4	(6.213)

Special Deal Type:	Not Applicable

Feasible Product Values (F.P.V's)

FIG. 46 CONT.

AS AT: 93.07.01.16.00.00.00	Report for:	Demdata Inc

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money/XPW's	Money	XPW's
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	N.A.
National Curr.type(if applic.)	AUD	AUD	N.A.
Amount	N.A.	29.540	As below

Pricing and Matching Process:	Minimize consideration payment under an EV/CE regime

64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

FIG. 47

CONTRACT VALUATION

CONTRACT SUMMARY (GRAPHICAL)

Ordering Party:	Denisons
Counterparty:	Demdata Inc

Application ID:	100
O.P.Own reference:	5096263

Product: (ID:	1210)
Market	Factory Output Quality Indices
Sub-Market 64B.M.F.T.Index	Market Type Spot
Estab.date/time	92.02.10.17.00.00.00
Maturity date/time	95.02.10.17.00.00.00

Application Promoter	Demdata Inc
Product Sponsor	Demdata Inc
Counterparty-guarantor	--
Regulator	Dept of Defense

Order ID (if app.)	85746235
Conf.date/time (if app.)	93.07.01.14.38.50.00
Contract/Product context:	1 of 1

Valuations as at	94.11.15.10.00.00	
	F.P.V's	Contract
Expected Value	58	42.160
Std. Deviation	5	6.209

Special Deal Type:	Not Applicable

XPW's

```
180
160
140
120
100
 80
 60
 40
 20
  0
    0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62
```

Feasible Product Values (F.P.V's)

FIG. 47 CONT.

AS AT: 94.11.15.10.00.00.00   Report for: Denisons

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money/XPW's	Money	XPW's
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	N.A.
National Curr.type(if applic.)	AUD	AUD	N.A.
Amount	N.A.	29.540	As below

Pricing and Matching Process: Minimize consideration payment
under an EV/CE regime

64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

FIG. 48

CONTRACT MATURITY

CONTRACT SUMMARY (GRAPHICAL)

| Ordering Party: | Denisons |
| Counterparty: | Demdata Inc |

| Application ID: | 100 |
| O.P.Own reference: | 5096263 |

Product:	(ID	1210	)
Market	Factory Output Quality Indices
Sub-Market	64B.M.F.T.Index	Market Type	Spot
Estab.date/time	92.02.10.17.00.00.00
Maturity date/time	95.02.10.17.00.00.00

Application Promoter	Demdata Inc
Product Sponsor	Demdata Inc
Counterparty-guarantor	--
Regulator	Dept of Defense

Order ID (if app.)	85746235
Conf.date/time (if app.)	93.07.01.14.38.50.00
Contract/Product context:	1 of 1

Valuations as at	95.02.10.17.00.00.00	
	F.P.V's	Contract
Expected Value	74	100.660
Std. Deviation	0	0

Special Deal Type:	Not Applicable

XPW's

180
160
140
120
100
80
60
40
20
0

0 2 4 6 8 10 12 14 16 18 20 22 24 26 28 30 32 34 36 38 40 42 44 46 48 50 52 54 56 58 60 62

Feasible Product Values (F.P.V's)

FIG. 48 CONT.

AS AT: 95.02.10.17.00.00.00   Report for: Denisons

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money/XPW's	Money	XPW's
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	N.A.
National Curr.type(if applic.)	AUD	AUD	N.A.
Amount	N.A.	29.540	As below

Pricing and Matching Process: Minimize consideration payment
under an EV/CE regime

64 66 68 70 72 74 76 78 80 82 84 86 88 90 92 94 96 98 100

FIG. 49

APPLICATION SPECIFICATION

Part A

Application ID:	001	Applicable Product ID's
Application Promoter:	Newcom Inc	Preferred/preferential dealing?
Primary Application Use:	Hardware capacity management	Pre or Post Tax Matching?
Feasible Counterparty No's:	Multiple counterparties	Tax deduction/subsidy at source?
Public/private use?:	Private	Degree of Trading transparency:
Acceptable comms mediums:	Computer to computer	Secondary trading allowed?
Retail/Wholesale Use:	Wholesale	Derivative trading allowed?
Pricing and Matching	Minimize consideration	Deferred Order Submissions possible?
Process:	payment under an EV/CE regime	Partial Matches possible?
		Settlement terms:
		- considerations
		- entitlements
Contract Revaluation Frequency:	Daily	Manual Approvals possible?
		Ordering Party consideration credit?
Ordering Parties allowed negative		Collateralisation Payments?
contract payoffs?	Yes	- Counterparties
Application Access Limitations:	Nil	- Ordering Parties
		Bilateral Obligations Netting?
		Bilateral Payments Netting?
		Multilateral Obligations Netting?
		Multilateral Payments Netting?

Netting Details (if applicable)		Collateralisation Details (if applicable)	
Applicable Discount Rate:	Not applicable	Trustee:	Not Applicable
Obligation Netting trigger:	Not applicable		
Min required settlements:	Not applicable		

Ordering Party Consideration-Credit Options		
Counterparty provided?	--Participating Basis:	--Ord.Party-guarantor protected
		--Unprotected
	--Non-Participating basis:	--Ord.Party-guarantor protected
		--Unprotected
Ordering Party Guarantor provided?	--Participating basis:	
	--Non-Participating basis:	

FIG. 49 CONT.

AS AT   93.11.01.17.00.00.00

2001-2020	Application Access Limitations
Available	
Not applicable	Contract Ordering Parties:
Not applicable	Nil
Nil	
Yes	
Yes	
Yes	
Yes	Contract Counterparties:
	Nil
Immediate	
Immediate	
No	
No	
	Counterparty Guarantors:
No	Nil
No	
No	
No	Others:
No	Nil
No	

	Valuation Details	Consideration Credit Details
	Applicable Discount Rate:	Ordering Party Guarantor:
	6.50%	Not Applicable

Key:
Counterparty:
1. Interest Rate(% p.a.)
2. Participation rate(%)

Order Party-guarantor
1. Interest Rate(% p.a.)
2. Participation rate(%)

-Participating
-Non-Participating

-Participating
-Non-Participating

	1	2	3	4

FIG. 50

PRODUCT SPECIFICATION

P R O D U C T I D :   2001

Product Summary

Application ID: 001   Product Sponsor:

Product Specification

Market: Telecommunications Carrying Capacity

Sub-market: Prime T.T.U.'s   (Transmission time units 1200-1800 hrs daily NY-Boston link)

Market type: Spot

Establishment date/time: 93.11.01.17.00.00.00

Maturity date/time: 96.11.01.17.00.00.00

Minimum Product Definition Value: -1.000   Maximum Product Definition Value:

Product Details

Conditional Payoff Dimensions ID: One   Actual/Perceived Market Identifier:

Market Phenomena Class Identifier: Primary   Specific Phenomenon:

Elemental/compound sub-market Identifier   --   Sub-market Phenomenon Class Identifier:

Future Period Date/time Identifier: At Contract Maturity date/time   Event Type Identifier:

Minimum Product Definition Value: -1.000   Maximum Product Definition Value:

Product Establishment Date/time: 93.11.01.17.00.00.00   Product Maturity Date/time:

Consideration denomination of Product: Ord Party T.T.U.'s   Currency type denomination of
                                                              Product(if applic)

Entitlement denom. of Product: Counterparty T.T.U.'s (Transmission Time Units)

FIG. 50 CONT.

AS AT: 93.11.01.17.00.00.00

Newcom Inc

Consideration denom.type: Ordering party T.T.U.'s

Entitlement denom.type Counterparty T.T.U.'s

Currency type(if applic.): Not applicable

National currency type(if applic.): Not applicable

1.000   Product Step Value: 0.05

Actual   Elemental/compound

(Log of) difference in the OP's   Market Identifier:Single Market

utilization of the CP's network and the CP's utilization of the OP's network

--

Spot Value

1.000   Product Step Value: 0.05

96.11.01.17.00.00.00

         Not applicable   National currency type denomination

                   of Product (if applic.)   Not applicable

FIG. 51

PRIMARY ORDER SPECIFICATION		AS AT:

Ordering Party:	Basstel Co.
Own reference:	0GH582

Application ID:	001

Product:	(ID:	2001	)
Market	Telecommunications Carrying Capacity		
Sub-Market	Prime T.T.U.'s	Market Type	Spot
Estab.date/time	93.11.01.17.00.00.00		
Maturity date/time	96.11.01.17.00.00.00		

Application Promoter	Newcom Inc
Product Sponsor	Newcom Inc
Counterparty-guarantor	--
Regulator	I.T.T.

"X"Value:	4

X Range Value	1	2	3	4		
Alpha (X)	(1.00)	(0.35)	0.20	1.00		
Beta (X)	386.340	386.340	(498.43)	(498.43)		

G	1	11			
a	2		8		
m	3			11	
m	4				
a	5				

ORDER SUPPORT DETAILS	
Communications medium:	Computer-to-computer
Consideration Credit sought?	No
Desired Form of Consideration Credit(if appl.)	Not Applicable
Counterparty Collateralisation payments required?	No
Preparedness to make 'own' collateralisation payments(if applicable)?	Not Applicable
Applicable Marginal Tax rate(if applicable)?	
-Consideration:	Not Applicable
-Entitlements:	Not Applicable
Netting System Participation?	
-Bilateral Obligations netting?(if applic.)	No
-Bilateral Payments netting?(if applic.)	No
-Multilateral Obligations netting?(if applic.)	No
-Multilateral Payments netting?(if applic.)	No

FIG. 51 CONT.

94.06.01.14.25.30.00

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Consideration type	T.T.U.'s	T.T.U.'s	T.T.U.'s
Entitlement type	T.T.U.'s	T.T.U.'s	T.T.U.'s
Currency type(if applic.)	N.A.	N.A.	N.A.
National Curr.type(if applic.)	N.A.	N.A.	N.A.
Max.Consid.Amount	N.A.	58.000	As below

Pricing and Matching Process:
   Minimize consideration payment under an EV/CE regime

SPECIAL   Ordering party negative entitlement allowed.
DEAL TYPE:

Partial Matches desired? No	Unacceptable Counterparties and Other Stakeholders
Manual Approval of Matches desired? No	
Desired degree of trading transparency (if applicable) Not Applicable	Not Applicable
Applicable Consid./Entitlement Transfer Entity	
Account details: ABC Banking Corp	
Operating A/c 1-1-502026-345896-0	
Desired date/time of Order Submission: Immediate	
Desired Order retention period: 00.00.01.00.00.00	
Desired Max.time for counterparty manual order approval(if applic.): Not Applicable	
Preferred/Preferential Dealing:	
Nil	

FIG. 52

ORDER SPECIFICATION PRICING	By: Tasnet

COUNTERPARTY PRICING SPECIFICATION	Application ID: ProductID:

Defined Circumstances ID 8	Commission Rate: 1.00%	Discount Rate:

Feasible Product Definition Values	Gross Contingent Entitlement Amounts	OP/CP C/Credit Adjust	Net Contingent Entitlement Amounts	Component Product Prices
(1.00)-(0.35)	(386.340)	0.00	(386.340)	0.567639
(0.30)	(305.910)	0.00	(305.910)	0.022156
(0.25)	(225.470)	0.00	(225.470)	0.021499
(0.20)	(145.040)	0.00	(145.040)	0.019544
(0.15)	(64.610)	0.00	(64.610)	0.017349
(0.10)	15.830	0.00	15.830	0.017241
(0.05)	92.260	0.00	96.260	0.016989
0	176.700	0.00	176.700	0.016258
0.05	257.130	0.00	257.130	0.016001
0.10	337.560	0.00	337.560	0.015847
0.15	418.000	0.00	418.000	0.015654
0.20-1.00	498.430	0.00	498.430	0.290238

	1.036416

x Applic. Entitle. Exchange Rates   (...................)   (...................)   (...................)
= Base contract bid price(in Product Denom. terms)   C/E   Currency   Net Curr.
Net Present Value (at........   9.90% p.a. ...)
+ Flat Commission (..........   1.00%   ...)
= Contract Bid Price (in Product Denom. terms)
x Applic. Consid. Exchange Rates   (......C/E........)   (...........Currency..........)   (......Net Curr.........)
= Contract Bid Price (in OP requested terms)(if applic.)
   Implied Base 'Margin' on Contract
+ Exchange Rate and Consideration Investment Margin
= Implied Contract Value (to CP)

FIG. 52 CONT.

AS AT:94.06.01.14.26.40.00

| 001 2001 | Consideration Exchange Rates: (if applic) :C/E .....-..... Currency.....-..... Nat.Curr.....-..... |

| 9.90% p.a. | Entitlement Exchange Rates: (if applic) :C/E .....-..... Currency.....-..... Nat.Curr.....-..... |

Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurence	Net Contingent Entitlement (Valuation) Amts.	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
(219.302)	0.544514	(210.3675)	(210.3675)	
(6.777)	0.016838	(5.151)	(5.151)	
(4.847)	0.016793	(3.786)	(3.786)	
(2.8346)	0.016718	(2.425)	(2.425)	
(1.1209)	0.016614	(1.073)	(1.073)	
0.2729	0.016481	0.261		
1.6354	0.016320	1.571		
2.8727	0.016132	2.851		
4.1143	0.015918	4.093		
5.3493	0.015678	5.292		
6.5433	0.015414	6.443		
144.6633	0.29257	145.825		(498.43)
(69.432)	1.0000	(56.463)	(222.8025)	(498.430)

| 69.432 |
| 54.630 |
| 0.550 |
| 55.180 |

| 55.180 |

| 44.420 |

10.760
10.760

FIG. 53

ORDER SPECIFICATION PRICING   By : Aarcom

COUNTERPARTY PRICING SPECIFICATION | Application ID:
                                      | ProductID:

| Defined Circumstances ID | 9 | Commission Rate: | 0.90% | Discount Rate: |

Feasible Product Definition Values	Gross Contingent Entitlement Amounts	OP/CP C/Credit Adjust.	Net Contingent Entitlement Amounts	Component Product Prices
(1.00)-(0.35)	(386.340)	0.00	(386.340)	0.566603
(0.30)	(305.910)	0.00	(305.910)	0.018357
(0.25)	(225.470)	0.00	(225.470)	0.018492
(0.20)	(145.040)	0.00	(145.040)	0.018417
(0.15)	(64.610)	0.00	(64.610)	0.018313
(0.10)	15.830	0.00	15.830	0.016481
(0.05)	92.260	0.00	92.260	0.016320
0	176.700	0.00	176.700	0.016132
0.05	257.130	0.00	257.130	0.015918
0.10	337.560	0.00	337.560	0.015678
0.15	418.000	0.00	418.000	0.015414
0.20-1.00	498.430	0.00	498.430	0.292577

1.028702

x Applic. Entitle Exchange Rates   (..................)   (..................)   (..................)
                                           C/E   Currency   Net Curr.
= Base contract bid price(in Product Denom. terms)

Net Present Value (at........   8.50%   p.a...)

+ Flat Commission (..........   0.90%   ...)

= Contract Bid Price (in Product Denom. terms)

x Applic. Consid. Exchange Rates   (..................)   (..................)   (..................)
                                           C/E   Currency   Net Curr.
= Contract Bid Price (in OP requested terms)(if applic.)

  Implied Base 'Margin' on Contract

+ Exchange Rate and Consideration Investment Margin

= Implied Contract Value (to CP)

FIG. 53 CONT.

AS AT:94.06.01.14.26.40.00

| 001 2001 | Consideration Exchange Rates (if applic) | :C/E .....-..... | Currency.....-..... | Nat.Curr.....-..... |

| 8.50% p.a. | Entitlement Exchange Rates: (if applic) | :C/E .....-..... | Currency.....-..... | Nat.Curr.....-..... |

Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurence	Net Contingent Entitlement (Valuation) Amts.	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
(218.901)	0.545015	(210.561)	(210.561)	
(5.616)	0.017545	(5.3672)	(5.3672)	
(4.169)	0.017020	(3.83749)	(3.83749)	
(2.671)	0.016978	(2.4625)	(2.4625)	
(1.183)	0.016875	(1.0902)	(1.0902)	
0.261	0.016754	0.265		
1.571	0.016256	1.565		
2.851	0.015689	2.772		
4.093	0.015456	3.974		
5.292	0.015625	5.274		
6.443	0.015401	6.438		
145.829	0.291395	145.240		(498.430)
(66.200)	1.0000	(57.790)	(223.318)	(498.430)

| 66.200 |
| 54.900 |
| 0.490 |
| 55.390 |

| 55.390 |

45.960

9.430
9.430

FIG. 54

CONTRACT VALUATION

CONTRACT SUMMARY (GRAPHICAL)

Ordering Party:	Basstel Co.
Counterparty:	Tasnet

Application ID:	001
C.P.Own reference:	17M036

Product:	(ID:	2001)
Market	Telecommunications carrying capacity	
Sub-Market	Prime T.T.U.'s	Market Type Spot
Estab.date/time	93.11.01.17.00.00.00	
Maturity date/time	96.11.01.17.00.00.00	

Application Promoter	Newcom Inc
Product Sponsor	Newcom Inc
Counterparty-guarantor	--
Regulator	I.T.T.

Order ID (if app.)	92837465
Conf.date/time (if app.)	94.06.01.14.38.50.00
Contract/Product context:	1 of 1

Valuations as at	94.06.01.16.00.00.00	
	F.P.V's	Contract
Expected Value	(0.150)	54.236
Std. Deviation	0.023	9.207

Special Deal Type:	Ordering party negative entitlement allowed

T.T.U'S

400	
300	
200	
100	
0	
-100	(1.00) (0.95) (0.90) (0.85) (0.80) (0.75) (0.70) (0.65) (0.60) (0.55) (0.50) (0.45) (0.40) (0.35) (0.30) (0.25) (0.20) (0.15) (0.10) (0.05) 0.00 0.050 0.100 0.150 0.200
-200	
-300	
-400	
-500	

Feasible Product Values (F.P.V's)

FIG. 54 CONT.

AS AT   94.06.01.16.00.00.00   Report for: Basstel Co.

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	T.T.U.'s	T.T.U.'s	T.T.U.'s
Currency type(if app)	N.A.	N.A.	N.A.
National Curr.type(if applic.)	N.A.	N.A.	N.A.
Amount	N.A.	55,180	As below

Pricing and Matching Process:	Minimize consideration payment under an EV/CE regime

0.250 0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950 1.000

FIG. 55

CONTRACT VALUATION

CONTRACT SUMMARY (GRAPHICAL)

Ordering Party:	Basstel Co
Counterparty:	Tasnet

Application ID:		001
O.P.Own Reference:		06H582

Product:	(ID	2001	)
Market	Telecommunications carrying capacity		
Sub-Market	Prime T.T.U.'s	Market Type	Spot
Estab.date/time	93.11.01.17.00.00.00		
Maturity date/time	96.11.01.17.00.00.00		

Application Promoter	Newcom Inc
Product Sponsor	Newcom Inc
Counterparty-guarantor	--
Regulator	I.T.T.

Order ID (if app.)	92837465
Conf.date/time (if app.)	94.06.01.14.38.50.00
Contract/Product context:	1 of 1

Valuations as at	94.06.01.16.00.00.00	
	F.P.V's	Contract
Expected Value	(0.150)	54.236
Std. Deviation	0.023	9.207

Special Deal Type:	Ordering party negative entitlement allowed

T.T.U.'s

Feasible Product Values (F.P.V's)

FIG. 55 CONT.

AS AT   94.06.01.16.00.00.00   Report for: Tasnet

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	T.T.U.'s	T.T.U.'s	T.T.U.'s
Currency type(if app)	N.A.	N.A.	N.A.
National Curr.type(if applic.)	N.A.	N.A.	N.A.
Amount	N.A.	55,180	As below

Pricing and Matching Process: Minimize consideration payment under an EV/CE regime

0.300 0.350 0.400 0.450 0.500 0.550 0.600 0.650 0.700 0.750 0.800 0.850 0.900 0.950 1.000

FIG. 56

CONTRACT VALUATION

C O N T R A C T   S U M M A R Y   (G R A P H I C A L)

Ordering Party:	Basstel Co
Counterparty:	Tasnet

Application ID:	001
C.P.Own reference:	17M036

Product:	(ID	2001)
Market	Telecommunications carrying capacity	
Sub-Market	Prime T.T.U.'s	Market Type Spot
Estab.date/time	93.11.01.17.00.00.00	
Maturity date/time	96.11.01.17.00.00.00	

Application Promoter	Newcom Inc
Product Sponsor	Newcom Inc
Counterparty-guarantor	--
Regulator	I.T.T.

Valuations as at	94.11.22.10.00.00.00	
	F.P.V's	Contract
Expected Value	(0.400)	350.810
Std. Deviation	0.010	74.200

Order ID (if app.)	92837465
Conf.date/time (if app.)	94.06.01.14.38.50.00
Contract/Product context:	1 of 1

Special Deal Type:	Ordering party negative entitlement allowed

T.T.U.'s

Feasible Product Values (F.P.V's)

FIG. 56 CONT.

AS AT   94.11.22.10.00.00.00   Report for: Basstel Co

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	T.T.U.'s	T.T.U.'s	T.T.U.'s
Currency type(if app)	N.A.	N.A.	N.A.
National Curr.type(if applic.)	N.A.	N.A.	N.A.
Amount	N.A.	55.180	As below

Pricing and Matching Process: Minimize consideration payment
under an EV/CE regime

```
0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000
```

FIG. 57

CONTRACT MATURITY

C O N T R A C T S U M M A R Y (G R A P H I C A L)

| Ordering Party: | Basstel Co |
| Counterparty: | Tasnet |

| Application ID: | 001 |
| C.P.Own reference: | 17M036 |

Product:	(ID:	2001	)
Market	Telecommunications carrying capacity
Sub-Market	Prime T.T.U.'s Market Type Spot
Estab.date/time	93.11.01.17.00.00.00
Maturity date/time	96.11.01.17.00.00.00

Application Promoter	Newcom Inc
Product Sponsor	Newcom Inc
Counterparty-guarantor	--
Regulator	I.T.T.

Order ID (if app.)	92837465
Conf.date/time (if app.)	94.06.01.14.38.50.00
Contract/Product context:	1 of 1

Valuations as at	96.11.01.17.00.00.00	
	F.P.V's	Contract
Expected Value	(0.400)	386.340
Std. Deviation	0	0

| Special Deal Type: | Ordering party negative entitlement allowed |

T.T.U.'s

400
300
200
100
0
-100
-200
-300
-400
-500

(1.000)
(0.950)
(0.900)
(0.850)
(0.800)
(0.750)
(0.700)
(0.650)
(0.600)
(0.550)
(0.500)
(0.450)
(0.400)
(0.350)
(0.300)
(0.250)
(0.200)
(0.150)
(0.100)
(0.050)
0.00
0.050
0.100
0.150
0.200
0.250

Feasible Product Values (F.P.V's)

FIG. 57 CONT.

AS AT   96.11.01.17.00.00.00   Report for: Basstel Co

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	T.T.U.'s	T.T.U.'s	T.T.U.'s
Currency type(if app)	N.A.	N.A.	N.A.
National Curr.type(if applic.)	N.A.	N.A.	N.A.
Amount	N.A.	55,180	As below

Pricing and Matching Process: Minimize consideration payment
under an EV/CE regime

0.300
0.350
0.400
0.450
0.500
0.550
0.600
0.650
0.700
0.750
0.800
0.850
0.900
0.950
1.000

FIG. 58

APPLICATION SPECIFICATION

Part A

Application ID:	001	Applicable Product ID's:
Application Promoter:	B.L.C. Inc	Preferred/preferential dealing?
Primary Application Use:	Economic risk management	Pre or Post Tax Matching?
Feasible Counterparty Numbers:	Multiple counterparties	Tax deduction/subsidy at source?
Public/private use:	Public Use	Degree of Trading Transparency:
Acceptable comms mediums:	Computer-computer link	Secondary trading Allowed?
Retail/Wholesale Use:	Wholesale	Derivative trading Allowed?
Pricing & Matching	Minimize pre-tax consideration	Deferred Order Submissions possible?
Process:	payment under an EV/CE regime	Partial Matches possible?
		Settlement terms:
		- Considerations
		- Entitlements:
Contract revaluation frequency:	Daily	Manual Approvals possible?
		Ordering Party consideration credit available?
Ordering Parties allowed negative		Collateralisation payments required?
contract payoffs?	Yes	- Counterparties
Application Access limitations:	Nil	- Ordering Parties
		Bilateral Obligations Netting?
		Bilateral Payments Netting?
		Multilateral Obligations Netting?
		Multilateral Payments Netting?

Netting Details (if applic.)		Collateralisation Details (if applic.)
Applicable Discount rate:	9.80% p.a.	Trustee:
Obligation netting trigger:	100.000	NOT APPLICABLE
Min required settlements:	5.000	

Ordering Party Consideration-Credit Options		
Counterparty provided?	--Participating basis:	--Ord.Party-guarantor protected
		--Unprotected
	--Non-participating basis:	--Ord.Party-guarantor protected
		--Unprotected
Ordering Party Guarantor provided?	--Participating basis:	
	--Non-participating basis:	

FIG. 58 CONT.

AS AT   91.06.03.17.00.00.00

10020-11400	Application Access Limitations
Available	
Pre-Tax	Contract Ordering Parties
Not Applicable	NIL
NIL	
Yes	
Yes	
Yes	
Yes	Contract Counterparties
	NIL
Immediate	
Immediate	
No	
Yes	
	Counterparty Guarantors
Yes	NIL
Yes	
Yes	
Yes	Others:
No	NIL
No	

Valuation Details	Consideration Credit Details (if applicable)
Applicable discount rate: 9.80%	Ordering Party Guarantor: ADVENTCO Inc

	1	2	3	4	Key: Counterparty:
-Participating	7	1	0.5	0.3	1.Interest Rate(% p.a.)
-non-part. basis	7	1	0.5		2.Participation rate(%)
	8	1			
-Participating	11		0.5	0.3	Ord. Party-Guarantor
-non-part. basis	11		0.5		3.Interest Rate(%p.a.)
	19				4.Participation rate(%)
			16	1	
			20		

FIG. 59

PRODUCT SPECIFICATION	

PRODUCT ID:	10061

Product Summary	
Application ID: 001	Product Sponsor:

Product Specification

Market:	Stock Indices
Sub-market:	PTSE 75
Market type:	Spot
Establishment date/time:	91.06.03.17.00.00.00
Maturity date/time:	94.06.03.17.00.00.00

Minimum Product Definition Value:	1600	Maximum Product Definition Value:

Product Details

Conditional Payoff Dimensions ID:	One	Actual/Perceived Market Identifier:
Market Phenomena Class Identifier:	Share Price Index	Specific Phenomenon:
Elemental/compound sub-market Identifier	--	Sub-market Phenomenon Class Identifier:
Future Period Date/time Identifier:	At Contract Maturity date/time	Event Type Identifier:
Minimum Product Definition Value:	1600	Maximum Product Definition Value:
Product Establishment Date/time:	91.06.03.17.00.00.00	Product Maturity Date/time:
Cons./entitlement denomination of Product:	Money	Currency type denomination of Product(if applic)

FIG. 59 CONT.

AS AT   91.06.03.17.00.00.00

B.L.C. Inc

Consideration/entitlement denom.type:Money

Currency type(if applic.):   Com Bnk Dep.

National currency type(if applic.): AUD

2200   Product Step Value: 0010

Actual
PTSE 75   Elemental/compound Market Identifier:Single Market
--
Spot Value
2200   Product Step Value:0010
94.06.03.17.00.00.00
            Com Bnk Dep.   National currency type denomination
                                of Product (if applic.)   AUD

FIG. 60

PRIMARY ORDER SPECIFICATION   AS AT:

Ordering Party:	Abbots & Taylor
Own reference:	PQZ260

Application ID:	001

Product:	(ID:	10061	)

Market   Stock Indices
Sub-Market   PTSE 75   Market Type   Spot
Estab.date/time   91.06.03.17.00.00.00
Maturity date/time 94.06.03.17.00.00.00

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corporation
Regulator	Pacific Central Bank

					"X"Value:	4	
X Range Value	1	2	3	4	5	6
Alpha (X)	1600	1930	1990	2200		
Beta (X)	187.200	187.200	37.440	37.440		

G	1	11
a	2	8
m	3	11
m	4	
a	5	

ORDER SUPPORT DETAILS

Communications medium:	Computer-to-computer
Consideration Credit sought?	No
Desired Form of Consideration Credit(if appl.)	Not Applicable
Counterparty Collateralisation payments required?	Yes
Preparedness to make 'own' collateralisation payments(if applicable)?	Not Applicable

Applicable Marginal Tax rate(if applicable)?

-Consideration:	Not Applicable
-Entitlements:	Not Applicable

Netting System Participation?

-Bilateral Obligations netting?(if applic.)	No
-Bilateral Payments netting?(if applic.)	No
-Multilateral Obligations netting?(if applic.)	No
-Multilateral Payments netting?(if applic.)	No

FIG. 60 CONT.

93.01.01.17.37.06.00

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if applic.)	Com Bnk Dep	Com Bnk Dep	Com Bnk Dep
National Curr.type(if applic.)	AUD	AUD	. AUD
Max.Consid.Amount	N.A.	54,000	As below

Pricing and Matching Process:
    Minimize pre-tax consideration payment under an EV/CE regime

SPECIAL   Collateralisation Payments
DEAL TYPE:

Partial Matches desired? Yes	Unacceptable Counterparties and Other Stakeholders
Manual Approval of Matches desired? No	
Desired degree of trading	
Transparency(if applicable) Not Applicable	NIL
Applicable Consid./Entitlement Transfer Entity	
Account details: ABC Banking Corp	
Operating A/c 1-1-502026-619930-0	
Desired date/time of Order Submission: Immediate	
Desired Order retention period: 00.00.01.00.00.00	
Desired Max.time for counterparty	
manual order approval(if applic.): Not Applicable	
Preferred/Preferential Dealing:	
NIL	

FIG. 61

ORDER SPECIFICATION PRICING	By : Abrahamsons (Potential Counterparty No.1)

COUNTERPARTY PRICING SPECIFICATION	Application ID: ProductID:

Defined Circumstances ID 26	Commission Rate 1.25%	Discount Rate 10.00% p.a.

Feasible Product Definition Values	Gross Contingent Entitlement Amounts	Op/CP C/Credit Adjust.	Net Contingent Entitlement Amounts	Component Product Prices
<	0.00	0.00	0.00	
1600	(187.200)	0.00	(187.200)	0.000220
1610	(187.200)	0.00	(187.200)	0.000227
1620	(187.200)	0.00	(187.200)	0.000237
1630	(187.200)	0.00	(187.200)	0.000249
1640	(187.200)	0.00	(187.200)	0.000266
1650	(187.200)	0.00	(187.200)	0.000287
1660	(187.200)	0.00	(187.200)	0.000314
2130	(37.440)	0.00	(37.440)	0.029642
2140	(37.440)	0.00	(37.440)	0.028625
2150	(37.440)	0.00	(37.440)	0.027469
2160	(37.440)	0.00	(37.440)	0.026193
2170	(37.440)	0.00	(37.440)	0.024819
2180	(37.440)	0.00	(37.440)	0.023369
2190	(37.440)	0.00	(37.440)	0.021865
2200	(37.440)	0.00	(37.440)	0.020330
>	0.000	0.000	0.000	0.146635
				1.0402

x Applic. Entitle. Exchange Rates   (.................)   (.................)   (.................)
                                                    C/E   Curr.   Nat Curr.
= Base contract bid price(in Product Denom. terms)

Net Present Value (at........   10.00% p.a.   ...)

+ Flat Commission (..........   1.25%   ...)

= Contract Bid Price (in Product Denom. terms)

x Applic. Consid. Exchange Rates   (.................)   (.................)   (.................)
                                                    C/E   Curr.   Nat Curr.
= Contract Bid Price (in OP requested terms)(if applic.)

  Implied Base 'Margin' on Contract

+ Exchange Rate and Consideration Investment Margin

= Implied Contract Value (to CP)

FIG. 61 CONT.

AS AT 93.01.01.17.38.02.00

001 10061	Consideration Exchange Rates: (if applic) :C/E .....-..... Currency.....-..... Nat.Curr.....-.....

	Entitlement Exchange Rates: (if applic) :C/E .....-..... Currency.....-..... Nat.Curr.....-.....

Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurence	Net Contingent Entitlement (Valuation) Amts.	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
(0.041)	0.000020	(0.004)	(0.004)	(187.200)
(0.042)	0.000027	(0.005)	(0.005)	
(0.044)	0.000037	(0.007)	(0.007)	
(0.047)	0.000049	(0.009)	(0.009)	
(0.050)	0.000066	(0.012)	(0.012)	
(0.054)	0.000087	(0.016)	(0.016)	
(0.059)	0.000114	(0.021)	(0.021)	
(1.110)	0.029442	(1.102)	(1.102)	
(1.072)	0.028425	(1.064)	(1.064)	
(1.028)	0.027269	(1.021)	(1.021)	
(0.981)	0.025993	(0.973)	(0.973)	
(0.929)	0.024619	(0.922)	(0.922)	
(0.875)	0.023169	(0.867)	(0.867)	
(0.819)	0.021665	(0.811)	(0.811)	
(0.761)	0.020130	(0.754)	(0.754)	
0.000	0.158835	0.000	0.000	
(59.580)	1.0000	(55.000)	(55.000)	(187.200)

59.580
51.280
0.640
51.920

47.340

51.920

4.580

4.580

FIG. 62

ORDER SPECIFICATION PRICING	By : Carpenters Inc (Potential Counterparty No.2)

COUNTERPARTY PRICING SPECIFICATION	Application ID: ProductID:

Defined Circumstances ID 17	Commission Rate 1.30%	Discount Rate 9.8% p.a.

Feasible Product Definition Values	Gross Contingent Entitlement Amounts	Op/CP C/Credit Adjust.	Net Contingent Entitlement Amounts	Component Product Prices
<	0.00	0.00	0.00	
1600	(187.200)	0.00	(187.200)	0.000220
1610	(187.200)	0.00	(187.200)	0.000226
1620	(187.200)	0.00	(187.200)	0.000237
1630	(187.200)	0.00	(187.200)	0.000249
1640	(187.200)	0.00	(187.200)	0.000265
1650	(187.200)	0.00	(187.200)	0.000287
1660	(187.200)	0.00	(187.200)	0.000314
2130	(37.440)	0.00	(37.440)	0.029641
2140	(37.440)	0.00	(37.440)	0.028625
2150	(37.440)	0.00	(37.440)	0.027469
2160	(37.440)	0.00	(37.440)	0.026192
2170	(37.440)	0.00	(37.440)	0.024819
2180	(37.440)	0.00	(37.440)	0.023369
2190	(37.440)	0.00	(37.440)	0.021864
2200	(37.440)	0.00	(37.440)	0.020330
>	0.000	0.000	0.000	0.146635
				1.0300

x Applic. Entitle. Exchange Rates   (.................)   (.................)   (.................)
                           C/E   Curr.   Nat Curr.

= Base contract bid price(in Product Denom. terms)

Net Present Value (at........   9.80% p.a. ...)

+ Flat Commission (..........   1.30%   ...)

= Contract Bid Price (in Product Denom. terms)

x Applic. Consid. Exchange Rates   (.................)   (.................)   (.................)
                           C/E   Curr.   Nat Curr.

= Contract Bid Price (in OP requested terms)(if applic.)

   Implied Base 'Margin' on Contract

+ Exchange Rate and Consideration Investment Margin

= Implied Contract Value (to CP)

FIG. 62 CONT.

AS AT 93.01.01.17.38.02.00

001 10061	Consideration Exchange Rates: (if applic) :C/E ....-..... Currency.....-..... Nat.Curr.....-.....

	Entitlement Exchange Rates: (if applic) :C/E ....-..... Currency.....-..... Nat.Curr.....-.....

Implied Contingent Entitlement Amounts	Assessed Probabilities of Occurence	Net Contingent Entitlement (Valuation) Amts.	Net Contingent Negative Entitlement (Valuation) Amounts	Maximum Absolute Negative Entitlement Amount
(0.041)	0.000020	(0.004)	(0.004)	(187.200)
(0.042)	0.000028	(0.005)	(0.005)	
(0.044)	0.000037	(0.007)	(0.007)	
(0.047)	0.000049	(0.009)	(0.009)	
(0.050)	0.000065	(0.012)	(0.012)	
(0.054)	0.000087	(0.016)	(0.016)	
(0.059)	0.000114	(0.021)	(0.021)	
(1.110)	0.029442	(1.102)	(1.102)	
(1.072)	0.028425	(1.064)	(1.064)	
(1.028)	0.027266	(1.021)	(1.021)	
(0.981)	0.025993	(0.973)	(0.973)	
(0.929)	0.024619	(0.922)	(0.922)	
(0.875)	0.023169	(0.867)	(0.867)	
(0.819)	0.021666	(0.811)	(0.811)	
(0.761)	0.020130	(0.754)	(0.754)	
0.000	0.158834	0.000	0.000	
(60.840)	1.0000	(55.120)	(55.120)	(187.200)

(60.840)
52.370
0.680
53.050

53.050

47.440

5.610

5.610

FIG. 63

CONTRACT SPECIFICATION LIMITS   By: Abrahamsons

C O U N T E R P A R T Y   C O N S T R A I N T S   V E R I F I C A T I O N

Details / Measure	Incremental Impact	Individual Contract Constraint Impact		Single Product Port-folio Constraint Impact
		Min/max required incremental impact of contract	Status Check	Allowable Incremental Imppact of contract
Absolute Loss	187.200	500.000(max)	Y	NOT APPLICABLE
Expected Loss	55.000	100.000(max)	Y	600.000(max)
Exp.Incr.Value	4.580	300.000(min)	Y	NOT APPLICABLE

Details / Measure	Incremental Impact	All Mat. Dates Total Product Portfolio Constraint Impact	
		Allowable Incremental Impact of contract	Status Check
Absolute Loss		NOT APPLICABLE	
Expected Loss	55.000	210.000(max)	Y
Exp.Incr.Value		NOT APPLICABLE	

FIG. 63 CONT.

AS AT   93.01.01.17.38.02.00

	"Equivalent" Maturity Date Total Product Portfolio Constraint Impact		"Same Month" Mat. Date Total Product Portfolio Constraint Impact	
Status Check	Allowable Incremental Impact of Contract	Status Check	Allowable Incremental Impact of Contract	Status Check
	NOT APPLICABLE		NOT APPLICABLE	
Y	497.000(max)	Y	1046.000(max)	Y
	NOT APPLICABLE		NOT APPLICABLE	

	Current	Limit	Status Check
Contract expected loss as a proportion of the expected loss of all contracts/products	6 %	7 %	Y
Product expected loss as a proportion of the expected loss of all contracts/products	62 %	65 %	Y

FIG. 64

CONTRACT SPECIFICATION LIMITS				By: Carpenters Inc

C O U N T E R P A R T Y   C O N S T R A I N T S   V E R I F I C A T I O N

Details / Measure	Incremental Impact	Individual Contract Constraint Impact		Single Product Portfolio Constraint Impact
		Min/max required incremental impact of contract	Status Check	Allowable Incremental Imppact of contract
Absolute Loss	187.200	460.000 (max)	Y	NOT APPLICABLE
Expected Loss	55.000	93.000 (max)	Y	414.000 (max)
Exp.Incr.Value	5.610	280.000 (min)	Y	NOT APPLICABLE

Details / Measure	Incremental Impact	All Mat. Dates Total Product Portfolio Constraint Impact	
		Allowable Incremental Imppact of contract	Status Check
Absolute Loss		NOT APPLICABLE	
Expected Loss	55.120	661.000 (max)	Y
Exp.Incr.Value		NOT APPLICABLE	

FIG. 64 CONT.

AS AT   93.01.01.17.38.02.00

	"Equivalent" Maturity Date Total Product Portfolio Constraint Impact		"Same Month" Mat. Date Total Product Portfolio Constraint Impact	
Status Check	Allowable Incremental Impact of Contract	Status Check	Allowable Incremental Impact of Contract	Status Check
	NOT APPLICABLE		NOT APPLICABLE .	
Y	280.000(max)	Y	370.000(max)	Y
	NOT APPLICABLE		NOT APPLICABLE	

	Current	Limit	Status Check
Contract expected loss as a proportion of the expected loss of all contracts/products	4.5 %	5 %	. Y
Product expected loss as a proportion of the expected loss of all contracts/products	50 %	55 %	Y

FIG. 65

CONTRACT VALUATION

CONTRACT SUMMARY (GRAPHICAL)

| Ordering Party: | Abbotts & Taylor |
| Counterparty: | Abrahamsons |

Product:	(ID:	10061	)
Market	Stock Indices		
Sub-Market PSTE 75	Market Type	Spot	
Estab.date/time	91.06.03.17.00.00.00		
Maturity date/time	94.06.03.17.00.00.00		

Order ID (if app.)	9156515899
Conf.date/time (if app.)	93.01.01.17.38.11.00
Contract/Product context:	1 of 1

| Application ID: | 001 |
| O.P.Own reference: | POZ260 |

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corp
Regulator	Pacific Central Bank

Valuations as at	93.01.01.23.00.00.00	
	F.P.V's	Contract
Expected Value	1970	53.000
Std. Deviation	333	21.160

| Special Deal Type: | Collateralisation Payments |

AUD '000's

200 —
180 —
160 —
140 —
120 —
100 —
80 —
60 —
40 —
20 —
0 —

1600 1610 1620 1630 1640 1650 1660 1670 1680 1690 1700 1710 1720 1730 1740 1750 1760 1770 1780 1790 1800 1810 1820 1830 1840 1850 1860 1870 1880 1890

Feasible Product Values (F.P.V's)

FIG. 65 CONT.

AS AT: 93.01.01.23.00.00.00   Report for: Abbotts & Taylor

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if applic.)	Com Bnk dep.	Com Bnk dep.	Com Bnk dep.
National Curr.type(if applic.)	AUD.	AUD.	AUD.
Amount	N.A.	51,920	As below

Pricing and Matching Process:
   Minimize pre-tax consideration payment under an EV/CE regime

FIG. 66

CONTRACT VALUATION

C O N T R A C T   S U M M A R Y   (G R A P H I C A L)

Ordering Party:	Abbotts & Taylor	
Counterparty:	Abrahamsons	

Application ID:	001
C.P.Own reference:	FFR-263

Product:	(ID:	10061	)
Market	Stock Indices		
Sub-Market	PSTE 75	Market Type	Spot
Estab.date/time	91.06.03.17.00.00.00		
Maturity date/time	94.06.03.17.00.00.00		

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corp.
Regulator	Pacific Central Bank

Valuations as at	93.01.01.23.00.00.00	
	F.P.V's	Contract
Expected Value	1970	(53.000)
Std. Deviation	333	(21.160)

Order ID (if app.)	9156515899
Conf.date/time (if app.)	93.01.01.17.38.11.00
Contract/Product context:	1 of 1

Deal Type:	Collateralisation Payments

AUD '000's

Feasible Product Values (F.P.V's)

FIG. 66 CONT.

AS AT   93.01.01.23.00.00.00   Report for: Abrahamsons

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	Com Bnk dep.
National Curr.type(if applic.)	AUD.	AUD.	AUD.
Amount	N.A.	51,920	As below

Pricing and Matching Process: Minimize pre-tax consideration payment
under an EV/CE regime

1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200

FIG. 67

SECONDARY ORDER SPECIFICATION   AS AT:

| Acquiring Party: | Shearer & Associates |
| Own reference: | 61932076 |

Application ID:	001
Order ID:	9156515899
Acq.P.Own reference:	667-3

Product:	(ID:	10061	)
Market	Stock Indices		
Sub-Market	PSTE 75	Market Type	Spot
Estab.date/time	91.06.03.17.00.00.00		
Maturity date/time	94.06.03.17.00.00.00		

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corporation
Regulator	Pacific Central Bank

'X' Value: 4

X Range Value	1	2	3	4	5	6
Alpha (X)	1600	1930	1990	2200		
Alpha (X)	187.200	187.200	37.440	37.440		

G	1	11
a	2	8
m	3	11
m	4	
a	5	

CONTRACT CONDITIONS

Communications medium:	Computer-to-computer
Consideration Credit sought?	No
Desired Form of Consideration Credit(if appl.)	Not Applicable
Counterparty Collateralisation payments required?	Yes
Preparedness to make 'own' collateralisation payments(if applicable)?	Not Applicable
Applicable Marginal Tax rate(if applicable)?	
-Consideration:	Not Applicable
-Entitlements:	Not Applicable
Netting System Participation?	
-Bilateral Obligations netting?(if applic.)	No
-Bilateral Payments netting?(if applic.)	No
-Multilateral Obligations netting?(if applic.)	No
-Multilateral Payments netting?(if applic.)	No

FIG. 67 CONT.

93.06.06.08.00.00.00

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if applic.)	Com Bnk Dep	Com Bnk Dep	Com Bnk Dep
National Curr.type(if applic.)	AUD	AUD	AUD
Max.Consid.Amount	N.A.	60,000	As below

Pricing and Matching Process:
   Minimize pre-tax consideration payment under an EV/CE regime

SPECIAL   Collateralisation Payments
DEAL TYPE:

Partial Matches desired? Yes Manual Approval of Matches desired? No Desired degree of trading Transparency(if applicable) Not Applicable Applicable Consid./Entitlement Transfer Entity Account details: ABC Banking Corp Operating A/c 1-1-502026-846752-0 (and 1) Desired date/time of Order Submission: Immediate Desired Order retention perid: 00.00.01.00.00.00 Desired Max.time for counterparty manual order approval(if applic.): Not Applicable	Unacceptable Counterparties and Other Stakeholders
Preferred/Preferential Dealing:	NIL
NIL	

FIG. 68

CONTRACT VALUATION

CONTRACT SUMMARY (GRAPHICAL)

Ordering Party:	Shearer & Associates
Counterparty:	Abrahamsons

Application ID:	001
C.P.Own reference:	667-3

Product: (ID   10061   )

Market	Stock Indices		
Sub-Market	PTSE 75	Market Type	Spot
Estab.date/time		91.06.03.17.00.00.00	
Maturity date/time		94.06.03.17.00.00.00	

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corp
Regulator	Pacific Central Bank

Order ID (if app.)	9156515899		
Conf.date/time (if app.)	93.01.01.17.38.11.00		
Contract/Product context:	1 of 1		

Valuations as at	93.06.06.09.00.00.00	
	F.P.V's	Contract
Expected Value	1960	58.300
Std. Deviation	306	10.610

Special Deal Type:	Collateralisation Payments

AUD '000's

Feasible Product Values (F.P.V's)

FIG. 68 CONT.

AS AT   93.06.06.09.00.00.00   Report for: Shearer & Associates

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	Com Bnk dep.
National Curr.type(if applic.)	AUD.	AUD.	AUD.
Amount	N.A.	58.300	As below

Pricing and Matching Process:	Minimize pre-tax consideration payment under an EV/CE regime

1900 1910 1920 1930 1940 1950 1960 1970 1980 1990 2000 2010 2020 2030 2040 2050 2060 2070 2080 2090 2100 2110 2120 2130 2140 2150 2160 2170 2180 2190 2200

FIG. 69

CONTRACT VALUATION

CONTRACT SUMMARY (GRAPHICAL)

Ordering Party:	Shearer & Associates
Counterparty:	Abrahamsons

Application ID:	001
C.P.Own Reference:	667-3

Product:	(ID:	10061	)
Market	Stock Indices		
Sub-Market	PTSE 75	Market Type	Spot
Estab.date/time		91.06.03.17.00.00.00	
Maturity date/time		94.06.03.17.00.00.00	

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corp
Regulator	Pacific Central Bank

Valuations as at	94.01.01.17.00.00.00	
	F.P.V's	Contract
Expected Value	1800	162.360
Std. Deviation	283	35.160

Order ID (if app.)	9156515899
Conf.date/time (if app.)	93.01.01.17.38.11.00
Contract/Product context:	1 of 1

Special Deal Type:	Collateralisation Payments

AUD '000's

Feasible Product Values (F.P.V's)

FIG. 69 CONT.

AS AT   94.01.01.17.00.00.00   Report for: Shearer & Associates

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	Com Bnk dep.
National Curr.type(if applic.)	AUD.	AUD.	AUD.
Amount	N.A.	58.300	As below

Pricing and Matching Process:	Minimize pre-tax consideration payment under an EV/CE regime

FIG. 70

CONTRACT MATURITY

CONTRACT SUMMARY (GRAPHICAL)

| Ordering Party: | Shearer & Associates |
| Counterparty: | Abrahamsons |

| Application ID: | 001 |
| C.P.Own Reference: | 667-3 |

Product:	(ID:	10061	)
Market	Stock Indices		
Sub-Market	PTSE 75	Market Type	Spot
Estab.date/time	91.06.03.17.00.00.00		
Maturity date/time	94.06.03.17.00.00.00		

Application Promoter	B.L.C. Inc
Product Sponsor	B.L.C. Inc
Counterparty-guarantor	CNZ Banking Corp
Regulator	Pacific Central Bank

Valuations as at	94.06.03.17.00.00.00	
	F.P.V's	Contract
Expected Value	1820	187.200
Std. Deviation	0	0

Order ID (if app.)	9156515899
Conf.date/time (if app.)	93.01.01.17.38.11.00
Contract/Product context:	1 of 1

| Special Deal Type: | Collateralisation Payments |

AUD '000's

Feasible Product Values (F.P.V's)

FIG. 70 CONT.

AS AT   94.06.03.17.00.00.00   Report for: Shearer & Associates

	Consideration/ Entitlement Denomination	Consideration	Entitlement
Cons./Entitlement type	Money	Money	Money
Currency type(if app)	Com Bnk dep.	Com Bnk dep.	Com Bnk dep.
National Curr.type(if applic.)	AUD.	AUD.	AUD.
Amount	N.A.	58.300	As below

Pricing and Matching Process: Minimize pre-tax consideration payment
under an EV/CE regime

1

METHODS AND APPARATUS RELATING TO THE FORMULATION AND TRADING OF RISK MANAGEMENT CONTRACTS

TECHNICAL FIELD

This invention relates to methods and apparatus, including electrical computers and data processing systems applied to financial matters and risk management. In particular, the invention is concerned with the management of risk relating to specified, yet unknown, future events.

BACKGROUND ART

Individuals and enterprises are continually exposed to risk because of future events beyond their control. The outcome of those events can either positively or negatively impact on their wellbeing. Individuals and enterprises should generally prefer not to face exposure to the possibility of adverse consequences, regardless of their perception of the likelihood of such events occurring. It is in their interest to consider foregoing 'resources' they currently possess if doing so would reduce the possibility of being so greatly exposed to future outcomes.

Risk can take many forms in view of the large range and type of future events which might result in adverse consequences. Risk can be categorised, in one instance, as 'economic' in nature. Phenomena that constitute economic risk include: commodity prices, currency exchange rates, interest rates, property prices, share prices, inflation rates, company performance, and market event based indices.

Another characterisation of risk concerns 'technical' phenomena. This can include things like the breakdown of an electricity generation plant, aircraft engine failure, and the damage to, or failure of, orbiting telecommunications satellites. The outcomes for each of these phenomena will be adverse for the users and/or supplier.

Other forms of risk defy ready characterisation, such as weather-based (viz., rain damage or lightning strike), or other natural occurrences (viz., earthquakes or iceberg collision with sea-going vessels).

There are also less tangible risks associated with, for example, the emission of atmospheric pollutants or the disposal of intractable toxic wastes, in the sense that the future consequences are unknown, save that there is a notion, based on current information, that they could be adverse.

The capability to manage risk is more important today than it was in the past, and is likely to become ever-more important into the future, because there is an ever increasing exposure to a wider generic range of future phenomena beyond the control of individuals or enterprises. There is also a wider feasible range of possible future events, and greater uncertainty about the likelihood of occurrence, associated with any single future phenomenon viz., an increasing volatility.

It is also thought that individuals are now more risk-averse in recessionary times, when there are fewer available discretionary resources to trade-off to protect themselves from such adverse future events.

In the prior art, individuals and enterprises faced with 'technical' risk have hedged against future outcomes by mechanisms such as the adoption of quality assurance practices, warranties, increased research and development activity (and associated intellectual property rights such as patents, utility models and registered designs), the purchase of modernised plant and equipment, and improved

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inventory, occupational health and safety and employer/employee relations practices.

Consider a manufacturer of, say, integrated circuits (ICs), which has many clients wishing to purchase its ICs. The demand may result in a delay in delivery due to limited manufacturing capacity, thereby requiring advance production scheduling for orders already in-hand. Typically, the manufacturer will give a warranty to a purchaser as to measurable performance criteria for its ICs; if a batch does not perform to the specified criteria, the manufacturer is required by contract to replace that batch. That is, a purchaser may have no interest in obtaining monetary compensation for the poor quality ICs, as the purchaser needs the components for their own products. In that case, the 'consideration' the warranty makes is the priority scheduling of a substitute batch of that type of IC, possibly displacing other scheduled production runs, or deferring delivery to another purchaser.

Such contractual arrangements are piece-meal in nature, and can only be struck between the manufacturer and each individual purchaser. They also leave the manufacturer exposed to claims from other customers whose orders are delayed by the re-scheduling. The manufacturer has no convenient mechanism available to it to hedge against such claims, perhaps by way of reserving production rights with another manufacturer, in lieu of unavailability of their own manufacturing facility.

In the face of such 'economic' risk, it is known for individuals and enterprises to hedge against adverse outcomes by indirect means such as self-insurance, and directly by means such as futures contracts, forward contracts, and swaps.

There are disadvantages or limitations associated with such available economic risk management mechanisms. Particularly, they provide, at best, only indirect approaches to dealing with the risk management needs. The available mechanisms are relatively expensive, and provide limited phenomenon coverage, and therefore cannot meet the requirements of the party seeking to hedge against such wide-ranging future risk. The infrastructure and pay-out costs associated with switching between, say, a commodities market and a stock market are often prohibitive for entities small and large alike. As a consequence, entities find themselves saddled with obligations they have little control over and cannot escape.

In respect of the "less tangible" forms of risk, an example in the prior art of a form of management of that risk is that of 'pollution rights' sold by the U.S. Environmental Protection Agency (EPA) in March 1993 for the atmospheric emission of sulphur dioxide. This was done by an auction of "allowances" permitting the release into the atmosphere. By the year 1995, any company or organisation emitting sulphur dioxide in the U.S. without enough allowances to cover their total emissions will face prosecution. This means polluters must either buy further allowances, or else modify or replace their plant and equipment to reduce these emissions. The EPA will regulate the total number of allowances able to be obtained. The existing allowances have already become a valuable tradeable 'property' as between sulphur dioxide emitters, that is, even before the time when no further allowances will be able to be purchased.

Management techniques for the "less tangible" forms of risk are in their infancy. The existing forms indicate an emerging demand for systems and methods to enable effective management.

Specific examples in the prior art of patents relating to methods and apparatus which deal with various forms of risk

management include British Patent No. 2 180 380, in the name of Merrill Lynch Pierce Fenner and Smith Incorporated, directed to an Automated Securities Trading Apparatus (corresponding to U.S. Pat. No. 4,674,004, and further related to U.S. Pat. Nos. 4,346,442 and 4,376,978). Other examples include U.S. Pat. No. 4,739,478 assigned to Lazard Freres and Co., directed to Methods and Apparatus for Restructuring Debt Obligations, U.S. Pat. No. 4,751,640 assigned to Citibank, N.A., directed to An Automated Investment System, and U.S. Pat. Nos. 4,752,877, 4,722, 055, and 4,839,804 assigned to College Savings Bank directed to Methods and Apparatus for Funding Future Liability of Uncertain Cost.

The present invention comes about in view of the short-comings of existing risk management mechanisms, and the perceived increasing importance of the management of risk relating to specified, yet unknown, future events.

In this sense, the invention is directed to something having economic value to individuals, enterprises and societies as a whole. Methods and apparatus that provide for the management of risk offer material advantages by, for example, minimising adverse future outcomes, providing both a form of compensation in the event of adverse future outcomes, and forms of risk management not otherwise supported or available in the prior art, and thus have value in the field of economic endeavour.

DISCLOSURE OF THE INVENTION

The invention encompasses methods and apparatus enabling the management of risk relating to specified, yet unknown, future events by enabling entities (parties) to reduce their exposure to specified risks by constructing compensatory claim contract orders on yet-to-be-identified counter-parties, being contingent on the occurrence of the specified future events. The entities submit such orders to a 'system' which seeks to price and match the most appropriate counter-party, whereupon matched contracts are appropriately processed through to their maturity.

Therefore, the invention enables parties to manage perceived risk in respect of known, yet non-predictable, possible future events. These future events may relate to measurable phenomena whose outcome is verifiable, and cannot be materially influenced by any other entity having a stake in that outcome.

The ability to price and match risk aversion contracts essentially comes about because of the nature of risk itself. Any number of people will each have differing views as to the likelihood of an outcome of some future event. This means that when each person is required to independently assess a range of outcomes for a specified future date, there almost always will be a variance in those assessments. Thus it is possible to match these expectations as between parties to form a contract. The potential counter-parties to an offered contract have the motivation of taking up an opportunity to exploit differing views of future outcomes to their advantage, either for some gain or, again, as a form of risk management.

It is important that the assessments as to future outcomes of events are made independently of any other party who could be a counter-party to a contract. The nature of the pricing and matching, therefore, is totally different to conventional negotiation or bidding as between parties.

The present invention enables entities to better manage risk, as they are able to think more explicitly about possible future events beyond their control which they perceive will have adverse consequences for them. They will have the

capacity to utilise existing resources to reduce exposure to a specific risk, and have access to a generally available mechanism by which they can explicitly trade-off existing assets for increased certainty about the future. They are also free to decide upon the degree to which they should make such trade-offs, and to actually effect and subsequently manage such trade-offs in a simple and low cost manner.

The present invention also provides an automated infra-structure to which parties have access without restrictions relating to nationality or residential requirements. This allows the parties to participate directly without requiring an intermediary.

Therefore, in accordance with one aspect of the present invention, there is disclosed a data processing system to enable the formulation of multi-party risk management contracts, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a range of future outcomes, and said contract data specifying a future time of maturity, entitlements due at maturity for the range of outcomes, and a consideration due to a counter-party stakeholder;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data as to a respective view of the outcomes in said predetermined range of outcomes in the future for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each said counter-party stake-holder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing and matching contracts from said contract data and said registering data, said pricing including selecting the registering data corresponding to the time of maturity for each predetermined phenomenon and calculating a counter-consideration derived from said entitlements, and said matching including comparing said consideration and said counter-consideration to match an offered contract with at least one of said counter-party stakeholders.

In accordance with a second aspect of the present invention there is disclosed a method to enable the formulation of multi-party risk management contracts, the method comprising the steps of:

(a) inputting into data processing apparatus, by at least one ordering stakeholder input means thereof, contract data representing at least one offered contract in at least one predetermined phenomenon having a range of future outcomes, and said contract data specifying a future time of maturity, entitlement due at maturity for the range of outcomes, and consideration due to a counter-party stakeholder;

(b) inputting into said data processing apparatus, by at least one counter-party stakeholder input means thereof, counter-party registering data as to a respective view of each outcome in said predetermined range of outcomes in the future for one or more of said predetermined phenomena;

(c) storing, in a data storage means of said data processing apparatus linked with each said stakeholder means and linked with each said counter-party stakeholder input means, said contract data and said registering data; and

(d) pricing and matching at least one of the offered contracts, by data processing means of the data pro-

cessing apparatus linked with said data storage means said pricing and matching comprising the steps, for each offered contract, of:

    (i) selecting the registering data corresponding to the time of maturity for a predetermined phenomenon;

    (ii) calculating a counter-consideration derived from the said entitlement;

    (iii) comparing the said consideration and the said counter-consideration; and

    (iv) matching a contract on the basis of the said comparison.

In preferred embodiments, the ordering stakeholders and counter-party stakeholders can be considered to be contract buyers and contract sellers respectively. The entitlement for each outcome can be in the form of 'money' payoffs (both positive and negative) at maturity of a matched contract, or can be other types of compensation, possibly in the form of goods, services, promises, credits or warrants. The consideration, whether buyer specified or seller calculated, can again be in the nature of a premium or payments, or can relate to other 'non-money' forms of property or obligations, typically transferable when a contract is matched, although possibly deferable, until, and potentially beyond, the time of maturity.

In the period between the match of a contract and maturity the various buyers, sellers and other contract stakeholders can review any contract to which they are a party and seek to trade that contract to other parties by the pricing and matching procedure, or variations on the pricing and matching procedure. They would tend to do so if their view of the future outcome of the phenomenon, being the subject of the contract, had changed markedly, or as a means to minimise expected losses if some unforseen adverse trend in the present day outcome of the phenomenon has occurred. As well as trading existing contracts, further contracts can be offered to 'lay off' or avert risk. Stakeholder parties can build up a portfolio of matched contracts and offered contracts, which are continually traded to obtain the best possible position at any time, and that position can be continually reviewed with time.

It is further possible for offered contracts to be based on the difference between phenomena, and so manage perceived risk as between the phenomena. Elemental contract phenomena can therefore be developed to meet the most particular needs of buyers and sellers, thus creating great flexibility.

In most instances the date of maturity will be predetermined by a 'product sponsor' stakeholder, who otherwise cannot be a buyer or seller of contracts they sponsor. Even so, it is conceivable that the date of maturity can be tied to a specified time from the instant a contract is matched. This may be appropriate where the time of maturity is in the near future, in which case offered contracts could otherwise remain unmatched following initial offer even up until the time of maturity.

Other stakeholders have executive roles in administration, guaranteeing the performance of buyers and seller, regulation, supervision and so on. In this way the number and types of buyers and sellers that can be considered in pricing and matching offered contracts can be controlled.

The invention also encompasses apparatus and method dealing with the handling of contracts at maturity, and specifically the transfer of entitlement.

Therefore, in accordance with a further aspect of the invention, there is disclosed a method of exchanging obligations as between parties, each party holding a credit record and a debit record with an exchange institution, the credit

records and debit records for exchange of predetermined obligations, the method comprising the steps of:

    (a) creating a shadow credit record and debit record for each party to be held independently from the exchange institutions by a supervisory institution;

    (b) obtaining from each exchange institution a start-of-day balance for each shadow credit record and debit record;

    (c) for every transaction resulting in an exchange obligation, the supervisory institution adjusts each respective party's shadow credit record or debit record, allowing only those transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order; and

    (d) at the end-of-day, the supervisory institution instructing ones of the exchange institutions to exchange credits or debits to the credit record and debit record of the respective parties in accordance with the adjustments of the said permitted transactions, the credits and debits being irrevocable, time invariant obligations placed on the exchange institutions.

BRIEF DESCRIPTION OF THE DRAWINGS

A number of embodiments of the invention will now be described with reference to the accompanying drawings, in which:

FIG. 1 shows a block diagram of a generic 'system' embodying the invention;

FIG. 2 shows a block diagram of an indicative hardware platform supporting the system of FIG. 1;

FIG. 3 shows a representation of INVENTCO and its main component parts;

FIG. 4 shows a block diagram of a subset of the components of an INVENTCO system's markets-depository (M-INVENTCO);

FIG. 5 shows a block diagram of the process components of a subset of one type of 'market' (termed CONTRACT APP) which can reside within M-INVENTCO;

FIG. 6 shows a timeline applicable to Example I;

FIG. 7 shows a timeline applicable to Example II;

FIGS. 8 to 16 show flow diagrams of the contract pricing and matching methodology;

FIG. 17 shows a timeline applicable to Example III;

FIGS. 18 to 70 show flow diagrams of the first to ninth process components for a CONTRACT APP; and

FIGS. 41 to 70 show tables and charts associated with Examples I, II and III.

DETAILED DESCRIPTION OF A BEST MODE FOR CARRYING OUT THE INVENTION

1. Introduction

The description firstly discusses the relation of the various users (stakeholders) of the 'system', followed by a consideration of a hardware data processing platform and peripheral input/output devices by which stakeholders interact with each other and the system.

This is followed by a discussion of the scope of the 'applications' that can be supported by the system in relation to the various stakeholders, and the interrelation of component parts thereof.

Details as to software methodologies for implementation of the applications supported by the system are also

described, including a number of worked examples relating to the formulation and trading of risk management contracts.

In the course of the detailed description reference is made to a number of non-conventional expressions and terminologies. For convenience, an explanation of these is listed in the Glossary hereinbelow.

2. 'Systems' Configurations

FIG. 1 shows a block diagram of a generic 'system' embodying the invention. The various stakeholders or parties to the system 10 each have access to a centralised processing unit 20. The processing units 20 can be constituted by one or more data processing apparatus, with each one thereof providing access for any one or more of the various stakeholders to applications software supported by the system 10, as all the processing units would be interconnected. Access to the one or more data processing apparatus is controlled by a generic form of communications co-ordination and security processing unit 25.

FIG. 1 also indicates that there are a number of types of stakeholder, and a number of individual stakeholders within each stakeholder type. The basic types of stakeholder are described as: applications promoters 11, product sponsors 12, product ordering parties (buyers) 13, potential product counter-parties (sellers) 14, counter-party guarantors 15, regulators 16, consideration/entitlement transfer ('accounting') entities 17, and miscellaneous parties 18. The detailed roles of each of these stakeholders will be subsequently described in greater detail at a later time. The number of types of stakeholder represented in FIG. 1 is typically the largest that will be supported by the system 10.

An embodiment of a computer system for the system 10 is shown in FIG. 2. The core of the system hardware is a collection of data processing units. In the embodiment described, the processing unit 20 comprises three interlinked data processors 93,97,104, such as the Sun 670 MP manufactured by Sun Microsystems, Inc. of the USA. Each processing unit 93,97,104 runs operational system software, such as Sun Microsystems OS 4.1.2, as well as applications software. The applications software is, in part, written around the flow diagrams subsequently described in FIGS. 8 to 16, and FIGS. 18 to 40, and accesses, or otherwise creates, the data files as summarised in the section headed PROCESS 2 VARIABLES AND DATA FILES hereinbelow. The processor configuration shown in FIG. 1 represents a large system designed to handle the transactions of thousands of stakeholders, the input and output data generated by those stakeholders, and risk management contract pricing, matching and subsequent processing functions.

Each processing unit 93,97,104 is operably connected with it one or more mass data storage units 95,100,110 to store all data received from stakeholders, and other data relating to all other software operations generating or retrieving stored information. Suitable mass storage units are, for example, such as those commercially available from Sun Microsystems.

A number of communications controllers 80,84,87, forming the communications co-ordination and security processing unit 25, are coupled with the processing unit 20. These controllers effect communications between the processing units 93,97,104 and the various external hardware devices used by the stakeholders to communicate data or instructions to or from the processing units. The communications controllers are such as the Encore ANNEX II, the IBM AS/400 server or the CISCO Systems AGS +.

A large range of communications hardware products are supported, and collectively are referred to as the stakeholder

input/output devices 70. One amongst many of the communication devices 70 are personal computers 51 and associated printers 52, which have communications connection with the communications controller 80 by means of a modem 50. There can also be an external host device 53, such as a mini or mainframe computer, again linked with the communications controller 80 by means of a modem 54. In other forms, communications can be established simply by means of a tone dialing telephone 56, which provides for the input of instructions or data by use of the tone dialing facility itself. In the alternative, a voice connection via an operator 75 can be effected by a conventional telephone 58. Both these external devices are shown connected with the communications controller 84. A further possibility is to have data transfer by means of a facsimile machine 65, in this case shown linked to the communications controller 87.

In all cases, users of the input devices are likely to be required to make use of system access password generation and encryption devices such as the Racal RG 500 Watchword Generator 66,67,68,69, (for personal use) and the Racal RG 1000, which is incorporated in a mainframe computer 53. The corresponding decoding units for these devices are incorporated in the communications controllers 80,84,87.

The generic processing unit 20 also includes a large number of 'portable' information recordal devices, such as printers, disc drives, and the like, which allow various forms of information to be printed or otherwise written to storage media to be transferable. This is particularly appropriate where confirmatory documentation of matched risk contracts is required to be produced, either for safekeeping as a hard copy record, else to be forwarded to any one or more of the stakeholders that are a party to each individual matched contract.

The generic system 10 shown in FIG. 1 encompasses many varied configurations, relating not only to the number and types of stakeholders, but also the 'architectures' realisable by the system hardware and software in combination. In that sense the arrangement shown in FIG. 2 is to be considered only as broadly indicative of one type of hardware configuration that may be required to put the invention into effect.

The 'virtual' level of the system 10 is termed INVENTCO. INVENTCO is a collection of one or more potentially interrelated systems, as shown in FIG. 3. Each INVENTCO system (INVENTCO SYSTEM #1 . . . INVENTCO SYSTEM #N) enables the formulation and trading of a wide range of contractual obligations, including risk management contracts. The hardware configuration shown in FIG. 2, is to be understood both as a realisation for a single INVENTCO system, and equally can represent a number of INVENTCO SYSTEMS, where the processing unit 20 is common to all and supports a number of communications co-ordination and security units 25, others of which are not shown, together with associated external communications devices 70, also not shown.

While INVENTCO allows the formulation and trading of risk management contracts, it is also responsible for processing of such contracts through to, and including, their maturity, and in some respects, subsequent to maturity.

Where there are a number of INVENTCO systems, those systems may be inter-dependent or stand-alone in nature. If inter-dependent, INVENTCO (10) is responsible for transactions between those systems.

INVENTCO and all of its component parts can be legally or geographically domiciled in separate countries or states.

The supra-national nature of INVENTCO enables the stake-holders to avail themselves of the risk management mechanisms independently of legal domicile or other such restrictions that are often a feature of some conventional risk management mechanisms, subject to meeting certain criteria regarding credit worthiness and such. Indeed, the legal domicile, location, ownership and participating stakeholders of INVENTCO, or any of the sub-systems, can be continually changing.

FIG. 3 further shows that each INVENTCO SYSTEM comprises an infrastructure component, termed I-INVENTCO, and a markets depository component M-INVENTCO. I-INVENTCO is concerned with coordination of communications and other security considerations, that part termed AXSCO, and also provides a network and general management system, termed VIRPRO. M-INVENTCO is a depository of authorised product-market (applications) software residing within INVENTCO under the authorisation of VIRPRO, and as distributed using I-INVENTCO.

One or more local or wide area telecommunication networks may link VIRPRO and M-INVENTCO to AXSCO, and thus to each other. In this way both VIRPRO and M-INVENTCO effectively reside around AXSCO.

AXSCO therefore comprises multiple, uniquely addressed communications controllers linked together in a number of possible ways. In one embodiment, AXSCO is represented by the communications co-ordination and security processing unit 25 shown in FIG. 2. The component hardware, such as the three controllers 80,84,87 shown in FIG. 2, typically are responsible for three types of operational applications. The first is in respect of time stamping data received from other parts of INVENTCO and data similarly transmitted to entities external of INVENTCO. The second is in respect of protecting the identity and/or location of entities within INVENTCO from one another, and from entities external to INVENTCO. The third is responsible for overall management of the routing of data received and to be transmitted within INVENTCO and to external entities thereto.

Referring now to FIG. 4, within M-INVENTCO reside different collections of system sponsored phenomena or 'markets', one collection of which is termed CONTRACT APPS. Each CONTRACT APP within the CONTRACT APPS 'markets' collection is essentially related to a specific type of risk management phenomenon. The purpose of individual CONTRACT APPS is two-fold. First, to effect the trading/exchange/transfer of risk management contracts (and derivatives of these transactions) between participating product ordering parties and counter-parties on terms acceptable to the parties involved, as well as to others within INVENTCO registered as having a legitimate interest in the nature, size and composition of these trades/exchanges/transfers. And second, to appropriately manage all matched/confirmed contracts through to their time of maturity.

Individual CONTRACT APPS are responsible for performing the above-described tasks according to the specific rules they embody, defined by their applicable stakeholders.

The role played by the various stakeholders to CONTRACT APPS, remembering that in many cases it would not be necessary to have the involvement of all the possible types of stakeholder, briefly stated is as follows:

(a) An application promoter is an entity having overall responsibility for the functioning of a CONTRACT APP, having being granted that responsibility by VIRPRO.

(b) A product sponsor is an entity which promotes and administers the rules of trading, and subsequent management of defined "products" selected for inclusion in a CONTRACT APP by its application promoter.

(c) An ordering party (buyer) is an entity seeking to acquire a CONTRACT APP product from a potential counter-party (seller).

(d) A counter-party (seller) is an entity potentially prepared to satisfy the CONTRACT APP product needs of an ordering party (buyer).

(e) A guarantor is an entity guaranteeing a seller's ability to settle or meet obligations as a result of a CONTRACT APP effected match.

(f) Regulators are entities overseeing the on-going performance of all other stakeholders involved in a CONTRACT APP, and especially guarantors.

(g) Consideration/entitlement transfer ('accounting') entities are those parties with which all other CONTRACT APP stakeholders maintain 'accounts' to transfer required considerations/entitlements to or from each other.

(h) Other miscellaneous parties are those having some other defined stake in the functioning of a CONTRACT APP.

In any implementation of the system, multiple numbers of each form of stakeholder are accommodated. A detailed consideration of the nature of CONTRACT APPS and the types of stakeholders to a CONTRACT APP is given in the section headed CONTRACT APPS hereinbelow.

As shown in FIG. 5, any one CONTRACT APP consists of a cluster of nine (and potentially more, or fewer) specific processes, these include:

(a) a process handling file administration and updating tasks supporting all other processes (termed Process 1);

(b) a process handling the receipt and processing of "primary" risk aversion contract transactions (termed Process 2);

(c) a process handling the receipt and processing of "secondary" risk aversion contract transactions (termed Process 3);

(d) a process handling the receipt and processing of "derivative-primary" risk aversion contract transactions (termed Process 4);

(e) a process handling the receipt and processing of "derivative-secondary" risk aversion contract transactions (termed Process 5);

(f) a process handling the "back office" management of all four types of risk aversion contract transactions, and transactions handled by Processes 7 to 9 (termed Process 6);

(g) a process handling non-CONTRACT APP-transaction related consideration, entitlement, and other "payment" obligation transfers between stakeholders (termed Process 7);

(h) a process handling CONTRACT APP (and authorised other INVENTCO) stakeholder access to specialist systems to assist the stakeholder concerned to decide how best to interface with a defined element of INVENTCO (termed Process 8); and

(i) a process handling CONTRACT APP (and authorised other INVENTCO) stakeholder access to a range of INVENTCO-facilitated "value added services" (termed Process 9).

A detailed discussion of the nine CONTRACT APP processes is given in the second headed DESCRIPTION OF CONTRACT APP PROCESSES hereinbelow.

All these processes collectively access multiple data files and multiple records within these files. A description of the variables and data files used by Process 2, a key component process of a CONTRACT APP, is provided in the second headed PROCESS VARIABLES AND DATA FILES hereinbelow.

The foregoing description identifies the essential interreaction between the hardware platform and the applications computer software run thereon.

A first example of the life-cycle of a risk management contract will now be described. A further detailed discussion of the nature of risk management contracts is given in the second headed RISK MANAGEMENT CONTRACTS hereinbelow.

3. Life Cycle of Risk Management Contract: Example I

The first example of a risk management contract describes a contract to manage risk associated with faults in microprocessors. In summary, the example shows how the system could enable one party, such as a supplier of military standard equipment seeking to avoid the adverse consequences of faulty microprocessors (specifically, 64-bit microprocessors) used in that equipment to make a contract with another party, such as a manufacturer of these microprocessors, who is seeking to exploit an opportunity based on their view of the future incidence of faults in the microprocessors they produce.

The specific offering is one which provides a contract ordering party with a specified contingent entitlement to "exclusive production warrants" (XPWs). That is, warrants providing the holder with priority access to a specified quantity of replacement and additional microprocessors sourced, immediately, from a defined, different, guaranteed high-quality, production line available to the supplier in consideration of payment of a money amount. The XPW entitlement is contingent on the value, at contract maturity date, of a percentage index of the proportion of 64-bit microprocessors shipped by the manufacturer, during a specified prior period, which are subsequently determined to be faulty to a defined degree. The defined degree, in this case, is the microprocessor being fault-free, as determined by successful completion of self-tests.

In this example, the relevant key stakeholders are: an application promoter (Demdata Inc); various product sponsors (the relevant one for the example being Demdata Inc itself); various primary product ordering parties (the relevant one for the example being Denisons); a single potential counterparty (Demdata Inc again); and an application regulator (the Department of Defence).

The timeline depicting the steps in the contract from the first step, Application Specification, to the final step, Contract Settlement is shown in FIG. 6. FIGS. 41–48 are eight detailed explanatory charts supporting FIG. 6. They should be read together with the following description.

Looking at the first step in the timeline (Application Specification) in conjunction with chart FIG. 41, it can be seen that Demdata Inc established a Contract APP (Application ID 100) on 92.02.10.17.00.00 (that is, in inverse order, 5 pm on Feb. 10, 1992) to deal with defect liability management. Application ID 100 supports a range of products (Applicable Product ID's 1200–1250).

Looking at the second step in the timeline (Product Specification) in conjunction with chart FIG. 42, it can be seen that Demdata was also Product Sponsor of Product 1210 at the same time (92.02.10.17.00.00). This Product relates to the market termed: Factory Output Quality Indices, and to the sub-market termed 64-bit Microprocessor Fault Tolerance Index. The maturity date for Product 1210

is 95.02.10.17.00,00.00. The consideration for a specific contract involving Product 1210 is in the form of money (commercial bank deposits denominated in Australian dollars). The entitlement is in the form of Exclusive Product Warrants (XPWs); these entitle the contract ordering party to priority access over the forward production capacity of a defined, guaranteed-high-quality, 64-bit microprocessor production line. Product 1210 specifies a range of 0% to 100% in 2% increments in respect of the sub-market outcomes.

Looking at the third step in the timeline (Potential Counterparty Product Pricing Specifications), it can be found that Demdata is acting as the sole potential counterparty for forthcoming primary product orders dealing with Product 1210. At this point in the timeline (93.07.01.14.00.00.00), 17 months after the specification of Product 1210, Demdata has currently-specified parameters for pricing potentially forthcoming orders for the product.

Looking at the fourth step in the timeline (Primary Order Specification) in conjunction with chart FIG. 43, it can be seen that an Ordering Party, Denisons, is seeking a contract (from the offering party, Demdata) in Product 1210 at that time (93.07.01.14.25,30.00), chart FIG. 43 shows the specific 'pay-off' parameters that Denisons has defined for the contract it is seeking at this time, including a maximum acceptable contract consideration (premium) amount of 32,000 (denominated in commercial bank. Australian dollars).

Looking at the fifth step in the timeline (Order Specification Pricing) in conjunction with chart FIG. 44, it can be seen that Demdata (using the specified pricing parameters set at 93.07.01.14.00.00.00) prices the Denison order at 93.07.01.14.26.40.00, Demdata's pricing parameters indicate that their appropriate Defined Circumstances ID for Denisons is 14. As is shown, this ID in turn implies a Commission Rate of 1.10%, a Discount Rate of 9.90%, a particular set of Component product prices and a particular set of Assessed Probabilities of occurrence over the range of feasible product values (outcomes).

The Contract Bid Price is calculated automatically by the application software in the following manner: The ordering party-specified desired contingent entitlement amounts, i.e. the "registered data", (covering the feasible product definition value range) are multiplied by the potential counterparty-specified component product prices (which will rarely add to "1" because each counterparty is endeavouring to 'game' potential ordering parties in different ways) to yield the corresponding number of implied contingent entitlement amounts. When added together, these figures sum to (34.110), where the brackets signify a negative value. This figure represents an expected future counterparty-entitlement payout amount (as at the designated contract maturity date of 95.02.10.17.00.00). The present day value of this figure, calculated using the specified discount rate of 9.90% per annum, is 29.220. To this amount is added the potential counterparty's desired flat commission amount of 1.10%, yielding a contract Bid Price (in the consideration/entitlement denomination of the product, commercial bank-denominated Australian dollars) of 29,540. No exchange rates are applicable in this case, because the ordering party, Denisons, is not seeking to deal in a consideration or entitlement denomination different to the denominations formally specified for the product. Demdata's parameters calculate that a consideration bid price of 29,540 will yield them a base margin on the contract of 3,180 (again denominated in commercial bank, Australian dollars).

This margin amount is calculated in the following manner: The ordering party-specified desired contingent entitle-

ment amounts (covering the feasible product definition value range) are multiplied by the potential counterparty-specified assessed probabilities of occurrence to yield a corresponding number of net contingent entitlement valuation amounts. When added together, these sum to (30.770). This amount represents an expected future counterparty-entitlement loss-on the contract (as at the designated contract maturity date of 95.02.10.17.00.00). The present value of this amount, calculated using the specified discount rate of 9.90% per annum, is 26,360. Thus, (ignoring for this example the margin Demdata may gain from using, in some manner, the consideration amount of 29,540 through to the time the contract expires, and various transaction fees) the margin Demdata can expect from entering into this contract with Denisons is their calculated present-value indifference price of 29,540 less their calculated present-value expected loss on the contract of 26,360 (or 3,180).

The amounts in the last two rows of the table of FIG. 44 are used for checking that this contract, if entered into by Demdata, will not result in them violating any self imposed portfolio valuation or composition limits. This notion is explained in detail in Example III.

Looking at the sixth step in the timeline (Order Matching), it can be found that Demdata's contract bid price of 29,540 is below Denison's specified maximum consideration price of 32,000, leading to a matching of the order at 93.07.01.14.29.10.00.

The seventh step in the timeline (Order/Contract Confirmation) can be soon to take place twelve minutes later at 93.07.01.14.38.50.00, after the system has determined that Denisons is able to (and then does) immediately pay the required consideration funds amount of 29,540 to Demdata.

Looking at the eighth step in the timeline (Contract Valuation) in conjunction with FIG. 45, it can be seen that a contract valuation report for Denisons was published not much longer than one hour after confirmation of the contract, that is, at 93.07.01.16.00.00.00. As can be seen, the market estimate of the future product value of the 64BMFT Index at this moment is 38 (with a standard deviation of 4), which implies that this contract has an expected future value of 29.330 XPWs (with a standard deviation of 6,213).

On FIG. 46 it can be seen the equivalent report for Demdata Inc of their expected future entitlement payout is identical to Denisons' expected future entitlement receipt (ignoring future fee payments which may be netted against these payments/receipts). The above-described market estimate of the future product value is determined by the system applying a defined composite of contract-counterparty assessed probabilities of occurrence figures drawn from the collection of all like contracts recently matched/confirmed by the system.

The ninth stop in the timeline (Contract Valuation) refers to a contract valuation report published for Denisons sixteen months later, at 94.11.15.10.0.00.00 (see FIG. 47). As can be seen, the market estimate of the future product value of the 64BMFT index at this moment is 58 (with a standard deviation of 5), which implies that this contract now has an expected future value of 42,160 XPWs (with a standard deviation of 6,209). This is an increase in expected future value of 12,830 XPWs for Denisons since the former valuation date/time.

The tenth step in the timeline, Contract Maturity, refers to the actual determination of the product value at time of maturity, 95,02.10.17.00.00.00. As can be seen on FIG. 48, this product value of the 64BMFT index was specified by Demdata (as Product Sponsor) to be 74, implying a contract value of 100,660 XPWs to Denisons and a corresponding

obligation on Demdata. The amount of 74 represents the percentage of 64-bit microprocessors shipped by Demdata, during a specified period some time before the designated contract maturity date, which are subsequently determined (possibly by the application regulator, The Department of Defence) to be faulty.

The eleventh step in the timeline involves the formal assignment of 100,660 XPWs by Demdata to Denisons (ignoring possible fee payments by one or both parties).

4. Life cycle of Risk Management Contract: Example II

The second example describes & risk management contract associated with the utilisation of telecommunications carrying capacity. In summary, the example shows how the system could enable one party (a telecommunications carrier) seeking to avoid the adverse consequences of under and over-committing their call carrying capacity between specified points (say, between the two cities, Now York and Boston) to make a contract with another party (say, another telecommunications carrier with call carrying capacity between the same two cities) similarly prepared to hedge against the consequences of this occurring.

The specific offering is one which provides a contract ordering party with a specified contingent entitlement to transmission time units between the hours 1200–1800 daily on the NY–Boston link within a defined future period (termed, Prime TTU's) upon assignment by the ordering party—to the counterparty—of a calculated consideration amount of Prime TTUs on the ordering party's own NY–Boston line within another defined future period (these defined TTUs may or may not be convertible to TTUs on other city links). The TTU entitlement is contingent on the value, at contract maturity date, of the log of the difference between the ordering party's utilisation of the counterparty's network and the counterparty's utilisation of the ordering party's network, during a specified prior period ending on the contract maturity date.

In this example, the relevant key stakeholders are: an application promoter (Newcom Inc); various product sponsors (the relevant one for the example being Newcom Inc itself); various primary product ordering parties (the relevant one for the example being Basstel Co.): two potential counterparties (Tasnet and Aarcom); and an application regulator (ITT).

The timeline depicting the steps in the contract from the first step, Application Specification, to the final step, Contract Settlement, is shown in FIG. 7. FIGS. 49–57 are nine detailed explanatory charts supporting FIG. 7. They should be read together with the following description.

Looking at the first step in the timeline (Application Specification) in conjunction with FIG. 49, it can be seen that Newcom Inc established a Contract APP (Application ID 001) on 93.11.01.17.00.00 (that is, 5 pm on Nov. 1, 1993) to deal with hardware capacity management. Application ID 001 supports a range of products (Applicable Product ID's 2001–2020).

Looking at the second step in the timeline (Product Specification) in conjunction with FIG. 50, it can be seen that Newcom Inc was also Product Sponsor of Product 2001 at the same time (93.11.01.17.00.00). This Product relates to the market termed Telecommunications Carrying Capacity and to the sub-market termed Prime TTUs. The maturity date for Product 2001 is 96.11.01.17.00.00.00. The consideration for a specific contract involving Product 2001 is in the form of "Ordering Party TTUs". The entitlement is in the form of "Counterparty TTUs"; these entitle the contract ordering party to "transmission time units between the hours 1200–1800 daily on the NY–Boston link (within a defined

..future period)". The feasible values of PRIME TTUs are normalised in the range of −1.0 to +1.0, respectively signifying the proportionate utilisation of respective networks as between the parties to a contract.

Looking at the third step in the timeline (Potential Counterparty Product Pricing Specifications), one can find two other carriers, Tasnet and Aarcom, acting as potential counterparties for forthcoming primary product orders dealing with Product **2001**. At this point in the timeline (94.06.01.14.00.00.00), 7 months after the specification of Product **2001**, both Tasnet and Aarcom have currently-specified parameters for pricing potentially forthcoming orders for the product.

Looking at the fourth step in the timeline (Primary Order Specification) in conjunction with FIG. **51**, it can be seen that an Ordering Party, Basstel Co., is seeking a contract, from an offering party, in Product **2001** at that time (94.06.01.14.25.30.00). Chart F4 shows the specific parameters (entitlements) that Basstel Co. has defined for the contract it is seeking at this time, including a maximum acceptable contract consideration amount of 58,000 (denominated in its own TTUs).

Looking at the fifth step in the timeline (Order Specification Pricing) in conjunction with FIG. **52**, it can be seen that Tasnet (using the specified pricing parameters set at 94.06.01.14.00.00.00) prices the Basstel Co. order at 94.06.01.14:26.40.00. Tasnet's pricing parameters indicate that their appropriate Defined Circumstances ID for Basstel Co. is 8. As is shown, this ID in turn implies a Commission Rate of 1.00%, a Discount Rate of 9.90% per annum, a particular set of Component product prices and a particular set of Assessed Probabilities of Occurrence. In a similar process to that described for Example I, this results in a Contract Bid Price of 55,180 (denominated in Basstel Co. TTUs), which Tasnet's parameters calculate will yield them a base margin on the contract of 10,760 (again denominated in Basstel Co. TTUs).

Still looking at the fifth step in the timeline, in conjunction with FIG. **53**, it can be seen that Aarcom (again using the specified pricing parameters set at 94.06.01.14.00.00.00) also prices the Basstel Co. order at 94.06.01.14.26.40.00. Aarcom's pricing parameters indicate that their appropriate Defined Circumstances ID for Basstil Co. is 9. As is shown, this ID in turn implies a Commission Rate of 0.90%, a Discount Rate of 8.50% per annum, a particular set of Component product prices and a particular set of Assessed Probabilities of Occurrence. This results in a Contract Bid Price of 55,390 (denominated in Basstel Co. TTUS), which Aarcom's parameters calculate will yield them a base margin on the contract of 9,430 (again denominated In Basstel Co. TTUs).

Looking at the sixth step in the timeline (Order Matching) it can be found that Tasnet's price bid of 55,180 is below Aarcom's bid of 55,390 and, in turn, that the 55,180 amount is below Basstel Co.'s specified maximum consideration price of 58,000. This leads to a formal matching of Basstel Co,'s order by Tasnet at 94.06.01.14.29.10.00.

The seventh step in the timeline (Order/Contract Confirmation) can be seen to take place nearly ten seconds later at 94.06.01.14.38.50.00, after the system has determined that Basstel Co. is able to (and then does) immediately assign the required consideration amount of 55,180 TTUs to Tasnet.

Looking at the eighth step in the timeline (Contract Valuation) in conjunction with FIG. **54**, one can see a contract valuation report for Basstel Co. published about two hours after confirmation of the contract, that is, at

94.06.01.16.00.00.00. As can be seen, the market estimate of the future product value of the log of the difference between Basstel Co.'s utilization of Tasnet's network and Tasnet's utilization of Basstel Co.'s network (during a specified prior period ending on the contract maturity date) at this moment is (0.150) (with a standard deviation of 0.023), which implies that this contract has an expected future value of 54,236 Tasnet TTUs (with a standard deviation of 9,207). On FIG. **55** one can see in the equivalent report for Tasnet that their required expected future entitlement payout is identical to Basstel Co.'s expected future entitlement receipt (ignoring future fee payments which may be netted against these payments/receipts).

The ninth step in the timeline (Contract Valuation) refers to a contract valuation report published for Basstel Co. five months later, at 94.11.22.10.00.00.00 (see FIG. **56**). As can be seen, the market estimate of the future product value of the log of the difference between Basstel Co.'s utilization of Tasnet's network and Tasnet's utilization of Basstel Co.'s network (during a specified prior period ending on the contract maturity date) at this moment is (0.400) (with a standard deviation of 0.010), which implies that this contract now has an expected future value of 350,181 Tasnet TTUs (with a standard deviation of 74,200). This is an increase in expected future value of 295,945 TTUS for Basstel Co. since the former valuation date/time.

The tenth step in the timeline (Contract Maturity) refers to the actual determination of the product value at time of maturity, 96.11.01.17.00.00.00. As can be seen on FIG. **57**, this product value of TTU's was specified by Newcom Inc (as Product Sponsor) to be (0.400), unchanged from the prior valuation date/time, implying a contract value of 368,340 Tasnet TTUs to Basstel Co. and a corresponding obligation on Tasnet. The amount is higher than the prior valuation figure due to the actual determination figure being naturally without a standard deviation element.

The eleventh step in the timeline involves the formal assignment of the 368,340 TTUs by Tasnet to Basstel Co. (ignoring possible fee payments by one or both parties).

5. Primary Product Order Processing

Before describing the third, and most detailed, example, consideration will be given to the 'core' product (contact) ordering, pricing and matching processes. Note that expressions such as (PORD NEW) represent file names.

The flow charts in FIGS. **8** to **16** depict the processing flow of the matching system for primary product orders submitted by ordering party stakeholders to a CONTRACT APP, where this APP is based upon: an EV-CE counterparty pricing regime (assuming paid consideration amounts do not yield an income stream in their own right); a sequential order matching process; consideration/entitlement value dates which are immediately after a product sponsor-designated date/time; and matching rules which do three things: First, identify, for each ordering party's order, a counterparty offering the lowest price bid for an order, subject to this price being at or below the specified maximum price the ordering party has indicated it is prepared to pay. Second, accommodate portfolio expected loss constraints on an 'equivalent maturity date products', 'same-month maturity products', and 'all-products' basis. And third, apply the above-described matching rules on a pre-tax basis, with partial matching of product orders, and without conditional order matching rules.

As shown in FIG. **8**, starting at block **610**, and proceeding to block **625**, the system determines which set of orders to process, authorises these orders, matches them with counterparties where possible, and then confirms them. As shown

in blocks 1010 to 1070 in FIG. 9, the system holds newly submitted orders (PORD NEW), and all previously submitted, but as yet unmatched, orders which are defined as queued orders (PORD QUEUE). Parameters and algorithms can be implemented to give the system the ability to determine whether new or queued orders are to be processed at any time. For example, a simplistic algorithm would be to alternate between PORD NEW and PORD QUEUE one order at a time. Another example would be to load queued orders only when there is a change in the counterparty parameters. Test 1020 checks the decision made in block 1010.

For new orders, the system moves to block 1030. Details of the next recorded new order are loaded from the PORD NEW master file (block 1040). The order data fields include: the ordering party identification (BID); the ordering party's own reference (BREF); the product identification (PID) specified by the ordering party; the entitlement "payoff" function type (PAYFUNC); the parameters for the entitlement "pay off" function (PAYPARAM); a "deal type" identifier (DTID); the anonymous and manual deal identifiers (OANON and OMANUAL); the order retention time limit (RET LIM); the maximum consideration the ordering party is prepared to pay (MAXCONSID); the number of the account from which the consideration is to be "paid" (ACC CONSID); and the number of the account to which any entitlement "pay off" amount is to be paid (ACC ENTITL). With this information set, the system's next step is to authorise the order. This occurs at block 1050.

Order Authorisation

Blocks 1100 to 1162 in FIG. 10 provide an expansion of block 1050. Starting at block 1100 the order is assigned a unique identification, which is set in the order data field OID. Before verifying the order, additional information is required by the system. At block 1110, details of the product (order data field PID) are loaded from the master file PPRODUCT (block 1120). The information includes the product maturity date (PMAT); the product consideration/entitlement denomination (PC/ED); the product currency denomination (PCUR) and national currency denomination (PNCUR); and the product limits and parameters (PMIN, PMAX, and PSTEP). The test 1130 checks that the order parameters are consistent with the master file parameters implied by the defined product identification (PID). Orders which fail this test are rejected at block 1140, with details of these orders being stored in the master file PORD REJ (block 1150). In turn, the ordering party is informed of this event (block 1160). Processing then returns to the start of the flow chart (block 1010), ready to load the next order. When an order is authorised, processing continues at block 640.

In the case of a queued order being loaded (block 1060), the order fields are set using the details stored in the queue file PORD QUEUE (block 1070). This data is a combination of new order data (as described in block 1030) and the data loaded/set when the order was originally verified (block 1110). Authorised order processing continues with the order matching process at block 640.

Order Matching

Blocks 1200 to 1616 in FIGS. 11 to 15 provide an explanation of block 640. Orders have retention time limits, stored in the order variable RET LIM. Test 1200 checks that the order retention time has not expired. If it has, the order is rejected at block 1210, with the order details copied to the rejected order file (PORD REJ). The ordering party is then

informed of the rejection at block 1230, and processing returns to the main loop via connector "A". If the order is still valid, the order matching process proceeds. The aim now is to find a suitable counterparty (or counterparties) who "prices" the ordering party's "entitlement function" within the limits set by the ordering party. Starting at block 1240, the matching process described is one which seeks to identify, for each ordering party's order, a counterparty offering the lowest "price bid" for an order subject to this price being at or below the specified maximum "price" the ordering party has indicated it is prepared to pay.

Blocks 1300 to 1370 in FIG. 12 provide an explanation of block 1240. The first step is to narrow down a group of counterparties prepared to at least deal with the ordering party. This is described as obtaining the available counterparty short list. First the counterparty short list is wiped (block 1300). Next, the order data fields BID (ordering part identification) and PID (product identification) are used to search the PDEAL LIST master file (block 1320) for all counterparties prepared to consider dealing with the ordering party in the specified product. Any stakeholders who have set a MANUAL or ANON flag are also loaded. For each counterparty selected, SID is set to the corresponding identification. Test 1330 commences a loop which allows every counterparty available to be dealt with in turn. For any currently selected counterparty (with identification set in SID), the data flow proceeds to test 1365. Where the order data field OANON has been set by the ordering party and some stakeholder requires manual confirmation (MANUAL (SID)), the current potential counterparty is not included in the short list. Likewise if the ordering party set OMANUAL and some other stakeholder required anonymity (ANON (SID)). In both cases, data flow returns to test 1330. Otherwise, flow continues at block 1335. At this point, the system determines the applicable "defined circumstances" for the order. It uses the order data fields currently loaded and parameters set in the PSEL DC masterfile (block 1336) to determine this. At block 1340, pricing parameters including consideration/entitlement exchange rates (if applicable), commission rates, and discount rates are selected from the PSEL PRICE master file (block 1350). Using the "defined circumstances" identification (set in DCID) all potential counterparties can have different sets of pricing parameters specified based on any of the order data fields of each order. Test 1360 checks that all the necessary parameters have been found. It is possible that the counterparty, though prepared to deal with the ordering party, does not have a complete set of pricing parameters for the current order specifications. Such a counterparty is not included in the counterparty short list, and processing returns to test 1330. At block 1370, the counterparty is added to the counterparty short list by including the pricing details in the variables: PRICEFUNC (SID), CR(SID), DR(SID), C-C/EDXCHANG(SID), C-CXCHANG(SID), C-NCXCHANG(SID), E-C/EDEXCHANG(SID), E-CXCHANG(SID), E-NCXCHANG(SID), MANUAL(SID), and ANON(SID). Processing then returns to test 1330 where the next selected potential counterparty is dealt with. When all selected potential counterparties have been processed, program flow returns to block 1250. At this point a potential counterparty short list has been obtained.

Blocks 1400 to 1550 in FIGS. 13 and 14 depict block 1250 in more detail, where every potential counterparty has its price offer calculated, based on their individual pricing parameters, for the currently loaded order. At block 1400 a loop commences allowing each potential counterparty in the potential counterparty shortlist to be dealt with in turn. SID

is set to the identification of the counterparty currently selected. Test **1410** checks whether any counterparties are left for processing. At block **1420**, the potential counterparty's price bid is calculated. Blocks **1490** to **1550** describe this calculation in more detail. At block **1490** the variable, INDEX, is assigned the starting value of the product value range (PMIN). Also, "price" is initialised to zero. Test **1500** commences a loop, where every index point in the product range is traversed. Block **1520** calculates the pricing value returned by the potential counterparty's pricing function, PRICEFUNC, as stored in (PRICEFUNC(SID)), at the current index point, and stores the value in P1. Block **1530** determines the pay-off amount required by the ordering party at the current index point and stores this value in P2. At block **1540**, the total price at the current index point is calculated by multiplying P1 by P2. This value is added to the running total stored in PRICE(SID). At block **1550**, the index counter (INDEX) is incremented by the product step size (PSTEP), and flow returns to the test **1500**. When the end of the product range has been reached (PMAX), flow proceeds to block **1510**, where the calculated price bid is modified by the following calculation:

$$PRICE(SID)=PRICE(SID) * E\text{-}C/EDXCHANG(SID) * E\text{-}CX\text{-}CHANG(SID) * E\text{-}NCXCHANG(SID).$$

Returning to block **1430**, the price bid stored in PRICE (SID) will be in the applicable product's consideration/entitlement denomination, currency denomination, and national currency denomination. The following steps (block **1430–1470**) determine and apply the applicable discount rate to the calculated price bid (currently in future value terms) to yield a price bid in present value terms. This is done as follows: At block **1430** the number of days to product maturity is determined. Block **1440** initialises the loop counter and discount rate divisor. For each day (or appropriate part thereof) between the current date/time and the product maturity date/time, the divisor is changed according to the formula (block **1460**):

$$DIV=DIV * (1+((DR(SID)/100)/365))$$

At block **1470**, the price bid is adjusted according to the formula:

$$PRICE(SID)=PRICE(SID)/DIV$$

Once the price bid in present value terms is known, the potential counterparty's defined commission is added to the price (block **1480**). Given that CR(SID) is a percentage commission rate, the formula is:

$$PRICE(SID)=PRICE(SID)+((CR(SID)/100) * PRICE (SID))$$

When test **1410** confirms that every potential counterparty has been priced, program flow continues at **1255**.

The test at **1255** checks whether the order was a "quote only" order. If so, flow continues at block **1256** where one or more of the counterparty bid prices are selected. At block **1230**, the ordering party is informed of the pricing information gathered. If the order was not a quote order (that is, it was a real product order), an attempt is now made to identify a counterparty from the potential counterparty short list matching the requirements of the current order. This is done at block **1260**. Blocks **1560** to **1616** in FIG. 15 describe this process in detail.

Starting at test **1560**, a check is made to ensure the potential counterparty shortlist is not empty. If it is, no match is possible and flow continues at block **1612**. At this point

SID is assigned "0" to indicate that no counterparty was selected from the potential counterparty short list, before moving to block **1614** where the entire order (as no part was matched) is queued. When the list is not empty, program flow continues at block **1570**, where the lowest priced counterparty is selected from the counterparty short list. This determination is done based upon each potential counterparty's bid price (PRICE(SID)), being converted to the consideration/entitlement type, currency, and national currency consideration "payment" denominations sought by the ordering party (that is, PRICE(SID)=PRICE(SID) * C-C/EDXCHANG(SID) * C-CXCHANG(SID) * C-NCXCHANG(SID)). The counterparty identification is stored in SID, and its price offer is stored in BPRICE. At block **1580**, the following check is made:

$$BPRICE>MAXCONSID$$

If the selected price is greater than the ordering party's specified maximum consideration payment (MAXCONSID) limit, a match with the current potential counterparty is not deemed possible. This must also be true for any of the remaining counterparties in the counterparty short list. This part of the matching process returns without any potential counterparty in the short list having been selected for a match (block **1612**). Otherwise, the current price is acceptable, and the process proceeds to attempt a match with the current selected counterparty.

The next step (block **1590**), requires all the applicable contract, product, and portfolio absolute loss, expected loss, expected value limits, and maximum composition limits to be read from the PSEL LIMIT master file (block **1600**) and stored in ALL1(SID), ALL2(SID), ELL1(SID), ELL2(SID), ELL3(SID), ELL4(SID), ELL5(SID), EVL1(SID), MC(SID) and MCC(SID). The current absolute and expected losses accumulated are also read and stored in CAL2(SID), CEL2(SID), CEL3(SID), CEL4(SID), and CEL5(SID).The ELFUNC(SID) and EVFUNC(SID) values are also set for use when calculating the expected loss and expected value for the current order. Block **1602** calculates the price of the order entitlement function using the counterparty product expected loss and expected value parameters ELFUNC(SID) and EVFUNC(SID). The order's expected loss is stored in EL(SID); the order's expected value is stored in EV(SID). The absolute loss function is also determined at block **1602** and it is stored in AL(SID). Proceeding to block **1604**, the portion of the order which will not violate the counterparty limits is calculated. This check is made at test **1606**. If no part of the order is matched, process flow continues at block **1608**. The potential counterparty is removed from the counterparty shortlist.

If some portion of the order is matched with the current counterparty, processing continues at block **1610**. Here the SID is set to the identification of the matching counterparty. The unmatched portion (if any) is stored at block **1614** as a new order in the PORD QUEUE masterfile (block **1616**). Flow then returns to test **1261** in FIG. 11. When a match occurs, program flow returns to block **650**. The matched order must now be confirmed by carrying out a number of additional steps, as shown in FIG. 16, blocks **1620** to **1641**. If no match occurred, processing of the current order steps, and program flow returns to the beginning via connector "A". The system is ready to load the next available order.

Matched Order Confirmation

For matched orders to become a contract, a number of additional actions are required. First, at test **1620**, a check

for manual authorisation is made. If required, program flow moves to block **1621** where authorisation requests are sent to the relevant stakeholders. Block **1623** then tests the replies for any rejections. If one or more rejections were received, program flow continues at block **1627** where the order is rejected. Otherwise, flow continues at **1624**. Block **1624** effects the consideration payment by creating transactions in the payment shadow file (PAYACC SHADOW— block **1625**). However, this may fail if the accounts specified do not exist or if at least the required consideration amount is shown not to be available. Test **1626** checks that "consideration payment" was effected successfully. If "consideration payment" fails, the matched order is rejected (block **1627**), with details stored in the rejected order master file, PORD REJ (block **1628**). The ordering party is then informed of this event at block **1640**.

With successful payment, program flow proceeds to block **1630** where the counterparty's current accumulated absolute and expected loss figures are updated (masterfile PSEL LIMIT—block **1631**). At block **1632**, the order data field OPRICE is set to the price given by the counterparty PRICE(SID), and SPRICE set to the counterparty's identification, SID. At block **1634**, the matched order is certified as confirmed, with full details recorded in the masterfile PORD CONF (block **1636**). The next step, block **1638**, reports details of the newly created contingent contract to all stakeholders concerned. Program flow then returns to the beginning, via connector "A". The system is now ready to start processing the next order submitted by a specified ordering party.

6. Life Cycle of Risk Management Contract: Example III

The third example of a risk management contract describes a contract to manage risk associated with potential future movements in the value of a specified index of share prices (termed the PTSE 75 index). In summary, the example shows how the system could enable one party (such as an institutional fund manager) seeking to avoid the adverse consequences of a significant decline in the future value of the PTSE 75 index (specifically a decline by June 1994, relative to the assumed current (January 1993) value of the Index) to make a contract with another, as-yet-unknown, party, such as another fund manager seeking to avoid the adverse consequences of a significant corresponding increase in PTSE 75 Index value.

The specific offering is one which provides a contract ordering party with a specified contingent entitlement to a compensatory Australian dollar future payout upon payment of a calculated up-front consideration money amount by the ordering party to the as-yet-unknown counterparty. The future money entitlement is contingent on the value, at contract maturity date, of the independently-determined value of the PTSE 75 index.

In this example, the relevant key stakeholders are: an application promoter (BLC Inc); various product sponsors (the relevant one for the example being BLC Inc itself); various product ordering parties (the relevant ones for the example being Abbotts & Taylor and Shearer & Associates); various potential counterparties (the relevant ones for the example being Abrahamsons and Carpenters Inc); a counterparty guarantor (CNZ Banking Corporation); and an application regulator (the Pacific Central Bank).

The timeline depicting the steps in the contract from the first stop (Application Specification) to the final step (Contract Settlement) is shown in FIG. **17**. FIGS. **58** to **70** are thirteen detailed explanatory charts supporting FIG. **17**. They should be read together with the following description.

Looking at the first step in the timeline (Application Specification) in conjunction with FIG. **58**, it can be seen that BLC Inc established a Contract APP (Application ID 001) on 91.06.03.17.00.00 (that is, 5 pm on Jun. 3, 1991) to deal with economic risk management. Application ID 001 supports a range of products (Applicable Product ID's **10020–11400**).

Looking at the second step in the timeline (Product Specification) in conjunction with FIG. **59**, it can be seen that BLC Inc was also Product Sponsor of Product **10061** at the same time (91.06.03.17.00.00). This Product relates to the Market termed Stock Indices and to the Sub-market termed PTSE 75. The maturity date for Product **10061** is 94.06.03.17.00.00.00. The consideration for a specific contract involving Product **10061** is in the form of money (commercial bank deposits denominated in Australian dollars). The entitlement is also in the form of commercial bank deposits denominated in Australian dollars, payable (if necessary) immediately after the Product's specified maturity date/time.

Looking at the third step in the timeline (Potential Counterparty Product Pricing Specifications), one can find two entities, Abrahamsons and Carpenters Inc, acting as potential counterparties for forthcoming primary product orders dealing with Product **10061**. At this point in the timeline (93.01.01.17.00.00,00), 19 months after the specification of Product **10061**, both Abrahamsons and Carpenters Inc have currently-specified parameters for pricing potentially forthcoming orders for the product.

Looking at the fourth stop in the timeline (Primary Order Specification), in conjunction with FIG. **60**, it can be seen that an Ordering Party, Abbotts & Taylor, is seeking a contract, from an offering party, in Product **10061** at that time (93.01.01.17.37.06.00). FIG. **60** shows the specific parameters (entitlement) that Abbotts & Taylor has defined for the contract it is seeking at this time, including a maximum acceptable contract consideration amount of 54,000 (denominated in commercial bank, Australian dollars).

In order to provide a more detailed explanation of the following fifth to seventh steps in the timeline, selected processing block numbers from FIGS. **8–16** will be referred to in brackets as follows:

Looking at the fifth step in the timeline (Order Specification Pricing) in conjunction with FIG. **61**, it can be seen that Abrahamsons' specified pricing parameters, as set at 93.01.01.17.37.05.00 are used to price the Abbotts & Taylor order at 93.01.01.17.38.02.00. Abrahamsons' pricing parameters indicate that their appropriate Defined Circumstances ID for Abbotts & Taylor is 26 [1240]. As is shown, this ID in turn implies a Commission Rate of 1.25%, a Discount Rate of 10.00% per annum, a particular set of Component product prices and a particular set of Assessed Probabilities of Occurrence. In a similar process to that described for Example I, this results in a Contract Bid Price of 51,920 (denominated in commercial bank, Australian dollars), which Abrahamsons' parameters calculate will yield them a base margin on the contract of 4,580 (again denominated in commercial bank, Australian dollars) [1250].

Still, looking at the fifth stop In the timeline, in conjunction with FIG. **62**, it can be seen that Carpenters Inc specified pricing parameters, as set at 93.01.01.17.37.06.00, are also used to price the Abbotts & Taylor order at 93.01, 01.17.38.02.00. Carpenters Inc's pricing parameters indicate that their appropriate Defined Circumstances ID for Abbotts

& Taylor is 17 [1240]. As is shown, this ID in turn implies a Commission Rate of 1.30%, a Discount Rate of 9.80% per annum, a particular set of Component product prices and a particular set of Assessed Probabilities of Occurrence. This results In a Contract Bid Price of 53,050 (denominated in commercial bank, Australian dollars), which Carpenters Inc's parameters calculate will yield them a base margin on the contract of 5,610 (again denominated in commercial bank, Australian dollars) [1250].

Again, still looking at the fifth step in the timeline, in conjunction with FIG. 63, it can be seen that Abrahamsons' pricing-related parameters (also set at 93.01.01.17.37.05.00) for determining the acceptability of ordered-contracts on the basis of their absolute loss, expected loss, expected value, and maximum portfolio composition attributes are satisfied by Abbotts & Taylor's order [1604]. From Abrahamsons' perspective, this qualifies Abbotts & Taylor's order for Inclusion in their product/contract portfolio, as long as Abrahamsons' consideration price bid turns out to be lower than Carpenters Inc's price bid, and, in turn, this bid is below the maximum consideration price that Abbotts & Taylor has specified, In Its order specification (FIG. 60), it is prepared to pay.

Finally, still looking at the fifth step in the timeline, but now in conjunction with FIG. 64, it can be seen that Carpenters Inc's pricing-related parameters (set at 93.01.01.17.37.06.00) for determining the acceptability of ordered-contract on the basis of their absolute loss, expected loss, expected value, and maximum portfolio composition attributes are also satisfied by Abbotts & Taylor's order. Now, from Carpenters Inc's perspective, this qualifies Abbotts & Taylor's order for inclusion in their product/contract portfolio, in this case, as long as Carpenters Inc's consideration price bid turns out to be lower than Abrahamsons' price bid, and, in turn, this bid is below the maximum consideration price that Abbotts & Taylor has specified, in Its order specification (Page G4), it is prepared to pay.

Looking at the sixth step in the timeline (Order Matching), it can be found that Abrahamsons' price bid of 51,920 is below Carpenters Inc's bid of 53,050 and, in turn, that the 51,920 amount is below Abbotts & Taylor's specified maximum consideration price of 54,000. This leads to a formal matching of Abbotts & Taylor's order by Abrahamsons' at 93.01.01.17.38.07.00 [1260].

The seventh step in the timeline (Order/Contract Confirmation) takes place five seconds later at 93.01.01.17.38.11.00, after the system has determined that Abbotts & Taylor is able to (and then does) Immediately pay the required consideration funds amount of 51,920 to Abrahamsons [650].

Looking at the eighth stop in the timeline (Contract Valuation) in conjunction with FIG. 65, one can see a contract valuation report for Abbotts & Taylor published nearly six hours after confirmation of the contract, that is, at 93.01.01.23.00.00.00. As can be seen, the market estimate of the future product value of the PTSE 75 Index at this moment is 1970 (with a standard deviation of 333), which implies that this contract has an expected future value of 53,000 commercial bank-denominated Australian dollars (with a standard deviation of 21,160). On FIG. 66 one can see in the equivalent report for Abrahamsons that their required expected future entitlement payout is identical to Abbotts & Taylor's expected future entitlement receipt (ignoring future fee payments which may be netted against these payments/receipts).

The ninth step in the timeline (Secondary Order Specification), detailed on FIG. 67, occurs nearly six months after the above-described contract valuation event; that is, at 93.06.06.08.00.00.00. At this time, Abbotts & Taylor is seeking to sell its position in the contract which was matched/confirmed at 93.01.01.17.38.11.00 (and at that time assigned the Order ID of 9156515800 by the system) at a price better than 57,000. Shearer & Associates is prepared to pay 60,000 (commercial bank deposit-denominated Australian dollars) for this position. In all other respects the contract's attributes remain unchanged. On FIG. 68, the tenth step in the timeline, a contract sale is seen to have occurred at a price of 58,300, just below the above-described 60,000 upper limit purchase-price amount specified by Shearer & Associates. This amount is the current best estimate of the contract's expected future value, with the standard deviation of this expected future value calculated by the system, utilizing other recent transaction data, as being 10,610. Shearer & Associates has now formally taken the place of Abbotts & Taylor as a stakeholder to the contract.

The eleventh step in the timeline (Contract Valuation) refers to a contract valuation report published for Shearer & Associates seven months later, at 94.01.01.17.00.00.00 (see FIG. 69). As can be seen, the market estimate of the future product value of the PTSE 75 Index at this moment is 1800 (with a standard deviation of 283), which implies that this contract now has an expected future value of 162,360 commercial bank deposit-denominated Australian dollars (with a standard deviation of 35,160). This is an increase in expected future value of 104,060 for Shearer & Associates since the former valuation date/time. The above-described market estimate of the future product value is determined by the system applying a defined composite of contract-counterparty assessed probabilities of occurrence figures drawn from the collection of all like contracts recently matched/confirmed by the system.

The twelfth step in the timeline (Contract Maturity) refers to the actual determination of the product value at time of maturity, 94.06.03.17,00,00,00. As can be seen on FIG. 70, this product value of the PTSE Index was specified by BLC Inc (as Product Sponsor) to be 1820, implying a contract value of 187,200 (commercial bank deposit-denominated Australian dollars) to Shearer & Associates, and a corresponding obligation on Abrahamsons. The figure of 1820 represents the actual value of the PTSE share price index at 94.06.03.17.00.00.00 as obtained by BLC Inc from the independently verifiable information source, the identity of which they would have disclosed at the time they first announced their sponsorship of trading in the PTSE 75 share Index product.

The thirteenth step in the timeline involves the formal payment of 187,200 (commercial bank deposit-denominated Australian dollars) by Abrahamsons to Shearer & Associates (ignoring possible fee payments by one or both parties).

7. Description of Consideration/Entitlement Payment Process

The purpose of the CONTRACT APP consideration/entitlement (and related transactions) payment/receipt process is to effect debits and credits to INVENTCO stakeholder accounts, typically at maturity of a contract, with participating consideration/entitlement transfer (or exchange) entities, reflecting payment/receipt entitlements and obligations originated within INVENTCO. The process effects these payments/receipts in a two-stage process. First, by debiting/crediting, on a real-time basis, the relevant

shadow records (in the data file PAYACC SHADOW) of the applicable stakeholder accounts-with a participating consideration/entitlement transfer entity (C/E entity), external to INVENTCO, with which they maintain an account. And second, by periodically effecting, via existing and potential payment mechanisms, corresponding payment instructions to the payment entities concerned. Details of the above-described mechanism are as follows.

All INVENTCO stakeholders maintain (a minimum of) two special-purpose (net-credit balance only) accounts with (at least) one selected, VIRPRO authorised, C/E transfer entity. The purpose of special-purpose accounts is to ensure that only INVENTCO-initiated debits and credits are capable of being effected to the accounts. Thus, at any time the balance of each PAYACC SHADOW file account record should, be equivalent to the true, but usually unknown, time-of-day balance of the actual account maintained by the C/E transfer entity.

The purpose of two accounts is to enable only credits to be effected through one account and only debits through another account. And the purpose of "net-credit balance only" accounts is to ensure that accumulated debits to the debits-only account never exceed the account opening balance plus accumulated credits to the credits-only account. C/E transfer entities will typically be (but do not need to be) institutions of any/all of six types: public/private record-registries of various types; credit card companies (typically for retail transactions only); commercial banks; central banks; taxation authorities; and non-bank clearing houses and depositories.

The resources transferred by these entities may be of any type. However, most typically, they will be deposits appropriate for the entity concerned: With respect to public/private record-registries—entitlement deposits (including shares in financial or physical assets, participation rights in wagers, and so on). With respect to credit/debit card companies—normal card company deposits (denominated in national currencies or synthetic currencies (for example, SDRs)). With respect to commercial banks—normal bank deposits (denominated in national currencies or synthetic currencies (for example, SDRs)). With respect to central banks—exchange settlement account (or equivalent) deposits. With respect to taxation authorities—taxation account deposits. And with respect to non-bank clearing houses and depositories—deposits of financial instruments, precious metals and the like. CONTRACT APP potential counterparties will also effectively be C/E transfer entities, as will ordering party guarantors (external to INVENTCO) where they offer credit to product ordering parties. Also, some accounts will be trust accounts maintained on behalf of potential counterparties (and some product ordering parties) involved in applications requiring the periodic payment of collateral to independent third parties to serve as an additional security device.

Immediately after the completion of its daily—or more frequent—transaction processing, and their associated settlement functions, each C/E transfer entity electronically notifies the applicable CONTRACT APP of the "opening balances" of all the debit and credit INVENTCO accounts it maintains (At this stage, the debit account balance should be zero and the credit account balance should be greater than or equal to zero). Where an INVENTCO stakeholder has an overdraft or line-of-credit with its C/E transfer entity, the credit value of this will be reflected in the non-zero balance of its credit account at this time.

Upon receipt of the above-described notifications, the applicable CONTRACT APP updates/confirms its stake-

holder shadow balances. Thus, at this point-in-time, all credit and debit shadow account balances should be equivalent to their actual debit and credit account balances.

Progressively throughout the day (where "day" here is likely to be different for each C/E transfer entity due to a combination of differences in the time-zone locations of payment entities in relation to the applicable CONTRACT APP, and the likely different account processing cycles of these entities), INVENTCO-stakeholder—authorised debits and credits to INVENTCO stakeholder shadow accounts are effected on a real-time basis—debits to debit accounts and credits to credit accounts. At all times, the CONTRACT APP ensures that the cumulative debit balance of each stakeholder's debits account does not exceed the "opening balance" plus the cumulative credit balance of the stakeholder's credit account. Thus, at any time, for every INVENTCO stakeholder, the combination of each stakeholder's debit account and credit account will represent the "true", net, time-of-day value of the stakeholder's two actual special-purpose accounts maintained external to INVENTCO.

Debits and credits to INVENTCO stakeholder accounts are effected according to strict rules and conditions, being different for credits and debits. Credits can be made to any INVENTCO stakeholder's credit account with its nominated C/E transfer entity by any other INVENTCO stakeholder for any reason. Naturally, as INVENTCO stakeholders will not know the account details of other stakeholders, such credits will be effected either automatically, according to information and rules known by the applicable CONTRACT APP, or semi-automatically by way of an INVENTCO stakeholder requesting from VIRPRO, as they need to do so, a credit-account number of the stakeholder to which they wish to transfer assets. This account number may only be valid for a nominated period and would not typically be the specified stakeholder's actual account number with its nominated consideration/entitlement transfer entity—it would only be a reference to an INVENTCO file containing this number.

On the other hand, debits can only be made to an INVENTCO stakeholder's debit account with its nominated C/E transfer entity by the stakeholder itself, and by other stakeholders explicitly granted this right by each stakeholder, subject to these other stakeholders exercising this right according to the rules and conditions specified for them.

Where an INVENTCO stakeholder seeks to initiate/authorise debits to its nominated account(s) on its own, this can only be done through the stakeholder satisfactorily completing the identification and security procedures set down by their C/E consideration/entitlement transfer entity (and reflected in VIRPRO-specified INVENTCO communication procedures). The type of procedure set down by all participating C/E transfer entities involves (at least) the following: First, the consideration/entitlement transfer entity supplying VIRPRO with a confidential file of account Pin numbers corresponding to each of its INVENTCO stakeholder debit accounts, and a similarly confidential "black box" which, by initiating any of a number of possible proprietary password request-response processes involving any one of its customers possessing the appropriate device (s), confirms that remote messages received from that customer, and processed by the "black box", are authentic. Second, the consideration/entitlement transfer entity supplying their INVENTCO customers with a programmable smart card (or equivalent device) enabling each customer, remotely—via telephone or direct computer line, to unambiguously confirm their identity with their INVENTCO-maintained account, thereby having the capability to autho-

rise debits to their account within predefined parameters concerning factors such as maximum transaction amounts, possible transaction types, account usage patterns and so on. Third, INVENTCO providing the mechanisms for direct, confidential, stakeholder communications with their C/E transfer entity shadow debit accounts, and the formal updating of these accounts, through non real-time processes, utilizing the unique time-stamped reference numbers created as/when stakeholders authorise access to their account records.

Where an INVENTCO stakeholder has authorised other INVENTCO stakeholders to initiate debits to (any of) its nominated account(s) according to a standing authority of some type, this can only be done through the authorised stakeholder itself satisfactorily completing the identification and security procedures set down by the authorisation-granting stakeholder's nominated C/E transfer entity (and reflected in VIRPRO-specified INVENTCO communication procedures). Once again, the type of procedure, set down by all participating C/E transfer entities in this respect, involves (at least) the following: First, the C/E transfer entity supplying VIRPRO with a confidential file of account Pin numbers corresponding to each of its INVENTCO stakeholder debit accounts and each other INVENTCO stakeholder which has been authorised to effect debits (within defined parameters) to these accounts. Second, the C/E transfer entity supplying VIRPRO with a similarly confidential black box which, by initiating any of a number of possible proprietary password request-response processes involving an entity nominated by any of its customers possessing the appropriate device(s), confirms that remote messages received from that authorised entity, and processed by the black box, are authentic. Third, the C/E transfer entity supplying their INVENTCO customers with a collection of programmable smart cards (or equivalent devices), for distribution to these authorised entities, enabling each authorised entity, remotely—via telephone or direct computer line—to unambiguously confirm their identity with the customer's PAYACC SHADOW account, thereby having the capability to authorise debits to this account (again, within predefined parameters concerning factors such as maximum transaction amounts, possible transaction types, account usage patterns and so on). And four, INVENTCO providing the mechanisms for direct, confidential, authorised stakeholder communications with a stakeholder's C/E transfer entity shadow debit account(s).

At the end of each C/E transfer entity's specified day (or part of a day), the applicable CONTRACT APP transfers (at least) two things to the entity: First, if required, a series of figures representing the exchange settlement (or equivalent) accounting entries it has or will communicate to the C/E transfer entity's appropriate clearing authority (for each of the applicable consideration/entitlement denomination, currency and national currency types of the payments/receipts involved) where these figures represent the balancing net debit or credit figure corresponding to the aggregation of all of the entity's INVENTCO customer transactions in the prior day. And second, a detailed file of all customer transactions effected during the day (corresponding, if required, to the above-described net figures). Upon their receipt of these transactions and summary figures, the C/E transfer entity then debits/credits each transaction to the appropriate actual customer accounts, enabling new "closing" account balances to be calculated (these "closing" balances should be exactly the same as the end-of-day balances communicated by the applicable CONTRACT APPS with it's file of customer transactions). In turn, these

."closing balances" become the C/E transfer entity's account "opening balances" for the next day. The CONTRACT APPS notification process then repeats itself.

Where applicable, at days-end for the "clearing house" of clusters of like C/E transfer entities (for example, a national central bank), CONTRACT APP transfers netted exchange settlement accounting entries to the clearing houses concerned. These entries serve to "balance the individual customer account entries transferred to each associated C/E transfer entity individually.

8. Industrial Applicability

The invention has industrial application in the use of electrical computing devices and data communications. The apparatus and methods described allow the management of risk in an automated manner by means of programming of the computing devices. The types of events associated with the risk management apparatus and methodologies includes physical and technical phenomena, and therefore have value in the field of economic endeavour.

GLOSSARY OF KEY TERMS

A.

Alpha (X)

The Ordering party-specified event value corresponding to the Xth future product event value contract entitlement payoff (payout) inflection point.

Application Promoter

An entity authorised by VIRPRO that specifies and administers defined rules and regulations underlying a defined CONTRACT APP—including the specific products offered for trading; categories of, and conditions of involvement, of stakeholders; nature of involvement and dispute resolution procedures of stakeholders.

Automatic/manual deal and no deal flags

Indicators notified by each stakeholder to CONTRACT APP specifying the manner in which that stakeholder wishes to deal with each other stakeholder.

AXSCO

A communications co-ordination and security system, linked to all stakeholders and component applications.

B.

Base Pricing probabilities

The prices set by sellers for unit entitlement payoffs of a contract at each of its possible future index values denominated in the contract's formally specified consideration/entitlement, currency and national currency.

Beta (X)

The Ordering party-specified desired entitlement payoff (payout) amount in the desired currency denomination of contract entitlement payout (payoff) and national currency denomination of contract entitlement payout (payoff) corresponding to the Xth event value inflection point. Bilateral Obligations Netting indicator

An indicator that individual 'rolling' net present values of future payment/receipt commitments to/from all pairs of participating stakeholders are to be netted.

Bilateral Payments Netting indicator

An indicator that individual end-of-day gross payments/receipts to/from all pairs of participating INVENTCO stakeholders are to be netted.

C.

Commission rate

The minimum required percentage profit margin required by a Potential Counterparty above the "breakeven" bid price for an Ordering party purchase order.

Consideration/Entitlement Transfer Entity

An entity acceptable to VIRPRO and the Application Promoter, satisfying defined minimum standards of financial strength, credit standing and integrity, able to maintain Consideration/entitlement accounts on behalf of stakeholders and effect transfers of those assets as directed.

CONTRACT APP stakeholder types

Expected stakeholder types are Application Promoter, Product Sponsor, Product Ordering party, Counterparty, Counterparty-Guarantor, Regulator, Consideration/entitlement Transfer Entities and Miscellaneous other parties.

Contract and Product "absolute loss" limit

A value limit specified by a potential counterparty of the maximum absolute loss it is prepared to sustain on a contract/product irrespective of the assessment of the likelihood of any particular level of possible loss being incurred.

Contract and Product "expected loss" limit

A value limit specified by a potential counterparty of the maximum expected loss it is prepared to sustain on a contract/product based on the counterparty's assessment of the likelihood of all levels of possible loss being incurred.

Contract Authorisation

A process of verifying that an Ordering Party product purchase order contains data appropriate to the product being sought and that the Ordering Party is accurately identified and credentialled.

Contract Collateralisation indicator

A descriptor set by the Application Promoter specifying whether and on what basis, counterparties may be required to periodically transfer assets/monies (collateral) to an independent trust fund to ensure they will be able to meet their potential entitlement payoff obligations on the maturity date of a contract.

Contract Confirmation

The process of securing the positive agreement of all affected stakeholders to a purchase order, including acknowledgement by the relevant Consideration/entitlement transfer entity of the Ordering party's ability to pay the required product consideration and fees, either automatically or through manual approvals.

Contract Matching

See Ordering party/Potential counterparty matching process.

Contractual Obligation

a. A binding commitment one entity (or group of entities) has to provide products or services or information to another entity (or group of entities) in exchange for an agreed quantity of other products, services or information.

b. A binding commitment all entities have to the network and general management system entity VIRPRO and thus to each other, to accept constraints on their activities imposed by other authorised entities on terms specified and agreed to by them as a condition of their participation in one or more of the component systems.

Contract Portfolio Netting

A term used to describe the process of "setting-off" or "netting", the future payment entitlement obligations between Ordering parties and Counterparties, either bi-laterally or multi-laterally.

Currency and National Currency exchange rates

The rates used to convert contract consideration/entitlement currency and national currency requirements into the product's consideration/entitlement currency and national currency denomination.

D.

Deal flag

An indicator or "flag" notified to CONTRACT APP signifying that the stakeholder is satisfied to deal unreservedly with the stakeholder against whom the flag has been set.

Defined Circumstances

The possible combinations of the categories of product-order information provided by Ordering parties.

Defined Probability Distributions

A set of pricing probability parameters specified by an Ordering party and including at least, a probability distribution type identifier, the expected value of the distribution, the standard deviation of the distribution and a probability distribution adjustment value or function.

Desired Currency Denomination of Contract Entitlement

A term indicating the currency in which an Ordering party wishes to receive potential entitlement payments from the sought contract.

Desired Currency Denomination of Consideration Payment

A term indicating the currency in which an Ordering party wishes to pay the required consideration for the contract sought.

Desired National currency Denomination of Contract Entitlement

A term indicating the National currency in which an Ordering party wishes to receive potential entitlement payments from the sought contract.

Desired National currency Denomination of Consideration Payment

A term indicating the National currency in which the Ordering party wishes to pay the required consideration for the contract being sought.

Discount rate

The rate used to determine the present value of a potential counterparty's expected future entitlements.

E.

Entitlement

The payout expected by the offering party at maturity as specified for each outcome in the range of outcomes. The payout can be both positive and negative in value over the range of outcomes, and can be in the form of money or other non-money types of goods, services, promises, credits or warrants.

EV-CE pricing

A price discovery mechanism for primary contracts meaning "expected value certainty equivalent pricing" being the calculated expected present value or future value of the contract.

Expected Value

A function in EV-CE pricing which means the sum of the products of all possible contract entitlement payoff/payout amounts and the Ordering party's/Counterparty's assessment of the probability of occurrence of the future events which would contractually give rise to these entitlement payoff amounts.

Expected value limits on a Counterparty's aggregate product portfolio

Optional value limits specified by a Potential counterparty at any one time, where time can be specified in terms including "equivalent maturity date"; "same-month maturity date" and "all possible maturity dates" including product expected loss limits and maximum (and possibly minimum) proportion of the expected total loss of the aggregate of the Counterparty's product portfolio that can be accounted for by the expected loss on the individual contract/product.

G.

Gamma(X)

The Ordering party-specified desired shape of the function between each of the co-ordinates Alpha(1), Beta(1) and Alpha(2), Beta(2) and so on; such that Gamma can represent all possible mathematically definable shapes.

I.

I-INVENTCO

The Infrastructure component of INVENTCO.

INVENTCO

A collection of one or more (potentially interrelated) systems, where each system is the combination of a telecommunications, computing and other forms of infrastructure, and a variety of markets and support services distributed by this infrastructure.

M.

M-INVENTCO

A depository of VIRPRO authorised "markets" application software.

Manual deal flag

An indicator or "flag" notified to CONTRACT APP by a stakeholder signifying that the stakeholder wishes to manually approve a transaction involving the other stakeholder against whom the flag has been set.

Multilateral Payments Netting indicator

An indicator that individual end-of-day gross payments/receipts to/from all participating stakeholders from/to a specified third party trustee/clearing entity are to be netted.

Multilateral Obligations Netting indicator

An indicator that individual 'rolling' net present values of future payment/receipt commitments to/from all participating stakeholders from/to a third party trustee/clearing entity are to be netted.

N.

Negative Contract Payoffs

A type of contract in which the contract Ordering party may have a contingent payoff to the contract's Potential counterparty (i.e. the reverse of a normal contract).

No Deal flag

An indicator or "flag" notified to a CONTRACT APP by a stakeholder signifying that the stakeholder does not wish to deal in any way with the other stakeholder against whom the flag has been set.

O.

Ordering party Contingent Claims Function

Specifications of a product payoff or a mathematical function to calculate an Ordering party's product payoff requirement.

P.

Portfolio Product "expected loss" limit

A value limit, specified by a potential Counterparty, of the maximum expected loss the potential Counterparty is prepared to sustain on its product portfolio based on the Counterparty's assessment of the likelihood of all levels of possible loss being incurred.

Product Ordering party

An entity acceptable to VIRPRO and the Application Promoter, interested in and able to acquire a CONTRACT APP product.

Product Establishment date/time

The date/time an Application Promoter first offers a defined product for trading.

Product future event value "density" indicator

An indicator specifying the number of intermediate points between the minimum and maximum future event product definition values specified for the product by the Application Promoter/Product Sponsor.

Product event value "width" indicator

An indicator specifying the range (minimum-maximum) of future event values accommodated by the product as set by the Application Promoter/Product Sponsor.

Product future event value

A term used to indicate the actual value of a defined product at its date/time of maturity.

Product Maturity date/time

The date-time at which the Application Promoter is required to make a determination of the actual event value to enable entitlement and related payoffs on successful contracts.

Product Price Quote requests

A type of product purchase order for which the matching process is terminated and the result communicated to the Ordering party, when a desired price bid or range of price bids has been obtained.

Product Purchase Orders

Specific product purchase orders for which the Ordering party is seeking a potential Counterparty match, which may be of three types: automatic orders; manual orders and "hide" orders.

Product Purchase Order withdrawals

Ordering party-initiated requests to withdraw from processing pre-submitted but as yet unconfirmed product purchase orders.

Product potential Counterparty

An entity acceptable to VIRPRO and the Application Promoter, exceeding a defined minimum standard of financial strength, credit standing and integrity, offering defined CONTRACT APP products to product Ordering parties.

Product Sponsor

An entity acceptable to VIRPRO and the Application Promoter, having responsibility for detailed definition of product parameters including the continual determination of product values over time.

R.

Regulator

An entity acceptable to VIRPRO having local, state, national or international jurisdiction over one or more CONTRACT APPS.

S.

Set of Pricing Probabilities

The range of probabilities a potential Counterparty applies to a class of Ordering party order, specified by the value of "defined circumstances" and applying to every feasible future product event defined for that product by an Application Promoter.

Stakeholder

An entity that is a registered participant in one or more of INVENTCO's component parts.

V.

Value Dates

The respective dates/times at which matched contract consideration and entitlements are agreed to be made by the relevant Ordering party/Counterparty to a contract.

VIRPRO

The network and general management system component of INVENTCO.

X.

"X"

A term indicating the number of contract payoff (payout) inflection points the Ordering party is seeking within the allowable range of future product event values (including the value range extremity points).

CONTRACT APPS

Overview

CONTRACT APPS is a term used to refer to certain types of units of applications software which can, but do not need to, reside within an INVENTCO system's (M-INVENTCO) depository of "markets" software. The purpose of individual CONTRACT APPS is two-fold: First, to effect the trading/exchange/transfer of risk aversion transactions (and derivatives of these transactions) between participating ordering

parties and counterparties on terms acceptable to the parties involved as well as to others within INVENTCO registered as having a legitimate interest in the nature, size and composition of these trades/exchanges/transfers. And second, to appropriately manage all matched/confirmed contracts through to their time of maturity, including their ultimate settlement.

Individual CONTRACT APPS perform theses tasks according to the specific rules they embody, defined by their own stakeholders. CONTRACT APPS effectively reside upon AXSCO and within M-INVENTCO.

Stakeholder Types

CONTRACT APPS accommodate eight (and potentially fewer) generic types of their "own" stakeholders (as distinct from other INVENTCO stakeholders) termed: application promoter, product sponsors, product ordering parties, potential product counterparties, counterparty-guarantors, regulators, consideration/entitlement transfer entities, and other miscellaneous parties.

Some details of these stakeholders are as as follows: an application promoter is an entity having overall responsibility for the functioning of a CONTRACT APP (that responsibility having been granted by VIRPRO); a product sponsor is an entity which promotes and administers the rules of trading, and subsequent management, of defined contingent claims contracting product(s) selected for inclusion in a CONTRACT APP by its application promoter; a product ordering party is an entity seeking to acquire a CONTRACT APP product from a potential product counterparty (where a product ordering party can also be a product counterparty); a potential product counterparty is an entity potentially prepared to satisfy the CONTRACT APP product needs of a product ordering party (where a potential product counterparty can also be a product ordering party); a counterparty-guarantor is an entity guaranteeing a product counterparty's ability to settle any/all of its potential entitlement transfer obligations to a product ordering party to which it has become a counterparty as a result of a CONTRACT APP effected "match"; regulators are entities overseeing the on-going performance of all other stakeholders involved in a CONTRACT APP, especially counterparty-guarantors; consideration/entitlement transfer entities are entities with which all other CONTRACT APP stakeholders maintain "accounts" to transfer required considerations/entitlements to/from all each other; and miscellaneous parties are all other entities having a defined stake in the functioning of a CONTRACT APP.

Miscellaneous parties include: independent entities contracted by application promoters or product sponsors to formally determine the "value" of products on their date-of-maturity; multilateral obligations and payment netting trustee/clearing entity organisations; independent (non-regulator) taxation and other governmental authorities; electronic "gateway" providers (external to INVENTCO); and host system organizations (in the case of CONTRACT APPS within INVENTCO systems linked to a common host system). CONTRACT APPS accommodate any number of their own stakeholders of each of the above-defined generic types.

Product Types

CONTRACT APPS can support risk aversion contract "product types" with any combination of values of multiple attributes, including: the fundamental nature/purpose of the product; the establishment/maturity date/time of the product; the consideration/entitlement denomination type, currency (if applicable), and national currency (if applicable) consideration/entitlement identifiers associated with the

product; the "width" and "density" identifiers of possible future event values of the product; and miscellaneous other product descriptors.

The "fundamental nature/purpose of the product" attribute may incorporate identifiers including: a conditional entitlement-payoff dimensions identifier; a market identifier; a sub-market identifier; and a market-type identifier. The "conditional entitlement-payoff dimensions identifier" specifies the number of dimensions to an ordering party's sought-after conditional entitlement-payoffs. The market identifier specifies whether the product relates to an "actual" or "perceived" phenomenon (or phenomena), the number of such phenomena (if applicable), and the applicable phenomenon category (for example, industrial, scientific, financial market hedging, and so on). The sub-market identifier provides a more specific description of the product concerned. The market-type identifier specifies the applicable future period date/time (where this can be anything—for example, "at a defined contract maturity date/time", "at a specified time on or before contract maturity date/time", and so on), and type-of-future event involved (where, again, this can be anything—for example, as an indicator of some relative value of a phenomenon (spot value, average value and so on), or as an indicator of the "rate-of-change" of some value of a phenomenon.

The "establishment and maturity date/time of the product" attribute specifies, respectively, the date/time an application promoter first offered a product for trading, and the date/time at which the defined product matures (that is, the date/time at which the product sponsor is required to make a determination of the actual event value at that date/time so enabling contract entitlement transfers to be effected).

The "consideration/entitlement denomination type, currency (if applicable), and national currency (if applicable) consideration/entitlement identifiers associated with the product" attribute specify: the type of consideration/entitlement involved (where this can include rights and entitlements, physical assets, and "money" of all possible types); in the case of a "money" consideration/entitlement type, the currency of the consideration/entitlement (where such currency types can include: public/private record-depository deposits, commercial credit card company deposits, commercial bank deposits, central bank deposits, taxation authority deposits, and deposits in non-bank clearing houses and depositories, and the like); and, again, in the case of a "money" consideration/entitlement type, the national currency of the consideration/entitlement identifier (where such national currency types can be in any national currency, or form of synthetic currency).

The "width and density identifiers of possible future event values of the product" attribute specifies, respectively: the minimum and maximum values of the allowable range of future event values accommodated by a product; and the number of intermediate points between the defined minimum and maximum future event values accommodated by the product.

The "miscellaneous other product descriptors" attribute specifies such things as: the degree of stakeholder access granted the product by the application promoter in question; the forms of trading-services granted the product by the application promoter in question (where this product attribute specifies the accessibility of the product to a range of feasible "stakeholder services" with respect to such things as contract portfolio netting, contract collateralisation, consideration credit provision, ordering party ability to specify negative contract entitlements, and availability of secondary/derivative market product trading); and the

degrees of trading, clearing and settlement "transparency" granted the product by the application promoter in question.

Transaction Types

A range of primary, secondary, derivative-primary, and derivative-secondary risk aversion contract transactions are accommodated by CONTRACT APPS.

The-range of "primary" (and derivative-primary (options, for example)) risk aversion contract transaction-types (handled principally by Processes 2 and 4—include: ordering party product orders (and option orders) for which the ordering party is seeking a counterparty "match", ordering-party price quote (and options price quote) requests; and ordering-party withdrawals of existing product orders (and withdrawal of options on product orders). Ordering party product orders consist of: automatic orders and manual orders. Automatic orders consist of: normal-automatic orders (being orders the ordering party is prepared to have matched automatically, subject only to the constraints defined in the ordering party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified); and anonymous-automatic orders (being orders the ordering party is prepared to have matched automatically, subject to the constraints defined in the ordering party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified, provided that no CONTRACT APP stakeholder has sought to manually authorise the transaction and, through so doing, being able to potentially identify the ordering party). Manual orders consist of normal-manual orders (being orders the ordering party wishes to manually authorise before they are finalised—that is, after a counterparty "match" has been effected but before the contract has been "confirmed"—subject only to the constraints defined in the ordering party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified); and anonymous-manual orders (being orders the ordering party wishes to manually authorise before they are finalised—that is, after a counterparty "match" has been effected but before the contract has been "confirmed"— subject to the constraints defined in the ordering party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified, provided that no CONTRACT APP stakeholder has also sought to manually authorise the transaction and, through so doing, potentially identify the ordering party).

The range of "secondary" (and derivative-secondary (options, for example) risk aversion contract transaction-types (handled principally by Processes 3 and 5—include: acquiring party product orders (and option orders) for which the acquiring party is seeking to "acquire" the position of a specified "risk counterparty" stakeholder in an existing contract; acquiring-party product price indications (and option price indications); and acquiring-party withdrawals of existing product orders (and option withdrawals).

Acquiring party product orders for which the acquiring party is seeking to "acquire" the position of a specified "risk counterparty" stakeholder in an existing contract, consist of automatic orders and manual orders.

Automatic orders consist of: normal-automatic orders (being orders the acquiring party is prepared to have matched automatically, subject only to the constraints defined in the acquiring party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified); and anonymous-automatic orders (being orders the acquiring party is prepared to have matched automatically, subject to the constraints defined in the acquiring party's order, in addition to whatever "match"

constraints other CONTRACT APP stakeholders have prespecified, provided that no CONTRACT APP stakeholder has sought to manually authorise the transaction and, through so doing, being able to potentially identify the acquiring party).

Manual orders consist of normal-manual orders (being orders the acquiring party wishes to manually authorise before they are finalised that is, after a "match" has been effected but before the contract "sale" is "confirmed"— subject only to the constraints defined in the acquiring party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified); and anonymous-manual orders (being orders the acquiring party wishes to manually authorise before they are finalised—that is, after a "match" has been effected but before the contract "sale" is "confirmed"—subject to the constraints defined in the acquiring party's order, in addition to whatever "match" constraints other CONTRACT APP stakeholders have prespecified, provided that no CON-TRACT APP stakeholder has also sought to manually authorise the transaction and, through so doing, potentially identify the acquiring party).

Primary Product Pricing Process Types

CONTRACT APPS enable potential counterparties to automatically establish "bids" on any defined (primary and derivative-primary) product order according to either an "expected value/utility-certainty equivalent" (EV/U-CE) pricing regime, or any other mathematically-definable pricing regime.

In the case of an "expected value-certainty equivalent" (EV-CE) pricing regime, each potential counterparty specifies, amongst other things: an indicator of certain defined attributes of an as-yet-unknown product order; a base commission rate; a base discount rate; (if applicable) a set of base consideration/entitlement denomination, currency, and national currency exchange rates; base unit product prices; and desired adjustments to the preceding base-bid-price determinants dependent on any specific order (submitted by a specified ordering party).

The above-described indicator of certain defined attributes of an as-yet-unknown product order (termed, defined circumstances) may reflect any combination of the multiple characteristics of an order (irrespective of the ordering party concerned), including: the multiple attributes of the contingent claims function sought; the ordering party's interest or otherwise in being granted credit by a counterparty; the ordering party's interest or otherwise in participating in the possible netting and collateralisation features of the APP; and the maximum (and possibly minimum) consideration amount the ordering party is prepared to pay for their defined product. The above-described base commission rate specifies the minimum required percentage profit margin required by the counterparty above their breakeven consideration bid price for a product order.

The above-described base discount rate determines the present value of the counterparty's expected future entitlement associated with a contract (net of the ordering party's consideration, and making allowance for the future income stream this consideration is expected to generate). The above-described set of base consideration/entitlement denomination, currency and national currency exchange rates are used, where applicable, to convert an ordering party's contract requirements into the base consideration/ entitlement denomination, currency and national currency of the product so enabling the contract matching process to make like comparisons of counterparty bids for product orders.

The above-described base unit product prices are prices set by potential counterparties for unit entitlement-payoffs of a contract at each of its possible future values, denominated in the contract's formally specified consideration/ entitlement type and, if applicable, currency type and national currency type (where these unit prices can be specified as directly input figures for every feasible future product event (the sum of which may or may not add to 1), or as parameters of defined mathematical functions). The above-described desired adjustments to the preceding base-bid-price determinants dependent on the specific ordering party submitting a specific order can include: a commission rate adjustment; a discount rate adjustment; a consideration/ denomination exchange rate adjustment; a currency exchange rate adjustment; and a national currency exchange rate adjustment.

In the case of an "expected utility-certainty equivalent" (EU-CE) pricing regime, each potential counterparty specifies all of the above-described parameters applicable to a EV-CE pricing regime as well as "utility bench-mark" figures for all possible consideration and entitlement "payment amounts" which could, conceivably, be associated with a product/contract.

Primary Product Matching Process Types

CONTRACT APPS may similarly accommodate any of a number of possible (primary and derivative-primary) order matching processes where these processes can be of multiple types, including sequential processes and simultaneous processes.

Sequential order matching processes can be characterised according to the "sequence determining" and "matching" rules they embody, where "sequence" rules may be of various types: "last-in-first-out (LIFO)", "first-in-first-out" (FIFO)", priced priority, and so on; and matching rules may also be of various types—for example, a specific matching process could seek, for each product ordering party, a counterparty (or counterparties) offering a product price at or below the maximum price the ordering party is prepared to pay (where the determined contract price could be either the lowest price offered by a potential counterparty, the mid-point between the an ordering party's specified "maximum consideration amount" and the lowest price offered by a potential counterparty, and so on); or seek for each potential product counterparty an ordering party prepared to pay the maximum price above a price at which the counterparty is prepared to deal (here, the determined contract price could be either: the ordering party's "maximum consideration amount" price, the mid point between the minimum price the counterparty is prepared to receive and the ordering party's "maximum consideration amount" price, and so on).

Simultaneous order matching processes are those seeking some type of optimum solution according to pre-defined objectives. For example: "maximise the number of ordering party-counterparty matches"; "maximize the aggregate consideration and/or entitlement value of ordering party-counterparty matches"; or "minimize the value of a function specifying the sum of the differences (possibly weighted according to their perceived importance) between the actual and desired values of match attributes of ordering parties and counterparties".

Both of the above-described sequential and simultaneous matching processes can also accommodate conditional contract matching rules; and pre and post tax price optimisation mechanisms.

Application Types

CONTRACT APPS may be: "in-house" APPS or "public" APPS; "single potential counterparty" APPS or "multiple

potential counterparty" APPS; APPS with differing degrees and forms of "regulator" oversight of other application stakeholders; and APPS with differing degrees and forms of "counterparty-guarantor" oversight of product potential counterparties.

CONTRACT APPS support consideration "payment" value dates being "immediate" (meaning exactly the time at which a contract match is confirmed); or deferred until a defined time in the future, measured in terms of seconds, minutes, hours, or days. Similarly, CONTRACT APPS support entitlement "payment" value dates being "immediate" (meaning exactly the time at which the applicable application promoter formally notifies other CONTRACT APP stakeholders of the "result" of a maturing contract); or deferred until a defined time after the "result" of a maturing contract is known.

CONTRACT APPS allow contracts to be modified and liquidated after their creation. Contracts can be modified through: direct negotiation by the relevant "risk counterparties" to a particular contract; or the purchase/sale of "derivative" secondary risk aversion contract transactions (See Process 5 description below). Contracts can be similarly liquidated after their creation through sale of the contract (within or outside INVENTCO); and through direct negotiation between the initial ordering party and counterparties to the contract. They can also be effectively liquidated through the ordering party/counterparty acquiring a mirror image of the contract to which they are a party (within or outside of INVENTCO).

Post Order Process Types

CONTRACT APPS undertake various generic types of "post-order-process" management functions for all the above-described generic types of "transactions", including: a function which maintains a formal record of contractual commitments entered into by all CONTRACT APP stakeholders with one another, and with VIRPRO-authorised entities external to either the applicable CONTRACT APP or INVENTCO overall; a function which effects the independent valuation of consideration and entitlement obligations between CONTRACT APP stakeholders, and between CONTRACT APP stakeholders and VIRPRO-authorised entities external to each applicable CONTRACT APP; a function which determines and effects "collateralisation" consideration/entitlement transfers between CONTRACT APP stakeholders, and between CONTRACT APP stakeholders and VIRPRO-authorised entities external to each applicable CONTRACT APP, based on above-described valuations of consideration and entitlement obligations associated with CONTRACT APP transactions; a function which determines and effects, as required, the bi-lateral netting of accumulated "consideration/entitlement" obligations "between CONTRACT APP stakeholders, and between CONTRACT APP stakeholders and VIRPRO-authorised entities external to each applicable CONTRACT APP; a function which determines and effects, as required, the multi-lateral netting of accumulated "consideration/ entitlement" obligations" between CONTRACT APP stakeholders, and between CONTRACT APP stakeholders and VIRPRO-authorised entities external to each applicable CONTRACT APP (involving a nominated third-party "clearing house" entity); a function which manages the processing, accounting, reporting, and entitlement "payment" tasks associated with maturing contracts; a function which determines system usage and access fees payable to/from all CONTRACT APP (and other INVENTCO) stakeholders, and to/from VIRPRO-authorised entities external to INVENTCO; a function which determines and

effects, as required, "bi-laterally netted" consideration/
entitlement transfers from/to CONTRACT APP stakehold-
ers themselves, and from/to CONTRACT APP stakeholders
and VIRPRO-authorised entities external to each applicable
CONTRACT APP; a function which determines and effects,
as required, "multi-laterally netted" consideration/
entitlement transfers from/to CONTRACT APP stakehold-
ers themselves, and from/to CONTRACT APP stakeholders
and VIRPRO-authorised entities external to each applicable
CONTRACT APP (involving a nominated third-party
"clearing house" entity); and a function which compiles and
distributes CONTRACT APP (and other INVENTCO)
stakeholder customised information.

Supplementary Process Types

CONTRACT APPS undertake various other types of
support processes, including: enabling stakeholders to trans-
fer consideration, entitlement and other "payment" obliga-
tions to and from one another, independently of transfers
initiated by CONTRACT APP transactions (See Process 7
description below); providing CONTRACT APP (and other
INVENTCO) stakeholders with shared access to specialist
systems to assist them to decide how best to interface with
the multiple aspects of INVENTCO (See Process 8 descrip-
tion below); and providing CONTRACT APP (and other
INVENTCO) stakeholders with access to a range of
INVENTCO-facilitated "value added services" (See Process
9 description below).

Matching Constraint Types

For their operation, CONTRACT APPS require all stake-
holders to a specific APP to specify, amongst other things,
which other stakeholders they do and do not want to have
interactions with, and the conditions under which they wish
to manually authorise some aspect of a transaction involving
any other CONTRACT APP stakeholder over which they
have control authority of some form.

In specifying which other stakeholders they do and do not
want to have interactions with, CONTRACT APP stake-
holders have various options. Application promoters can
specify acceptable product sponsors, products, ordering par-
ties and potential counterparties within their application—
individually and by type. Similarly, product sponsors can
specify acceptable application promoters, products, ordering
parties, potential counterparties and counterparty-guarantors
within their application—individually and by type.

Product counterparties and ordering parties (collectively)
can specify: ordering parties/potential counterparties they do
and do not want to deal with—individually and by type; the
extent of their preparedness to be involved in contract
netting and collateralisation arrangements provided for by
their application promoter; application promoters, product
sponsors, products, and consideration/entitlement transfer
entities they do and do not want to deal with—individually
and by type; ordering parties/potential counterparties they
prefer to deal with, and those with which they wish to deal
exclusively; the degree of trading transparency they require;
and their wish or otherwise to manually authorise order
matches before they are confirmed.

Potential counterparties can specify which ordering
parties, or classes of ordering parties, they are prepared to
offer credit to (and under what terms), and ones they are
prepared to allow "ordering party-guarantors" to offer credit
to and under what terms. Similarly, product ordering parties
(uniquely) can specify: counterparty-guarantors with which
they do and do not want to deal (individually and by type);
counterparties with which they wish to deal exclusively or
preferentially to obtain a particular form of counterparty-
credit; and potential "ordering party-guarantors" (external to
INVENTCO) with which they do and do not want to deal.

Counterparty-guarantors can specify which potential
counterparties have their authority to operate and which
application promoters, product sponsors and ordering parties
they are prepared, indirectly, to have relationships with.
Similarly, regulators can specify which counterparty-
guarantors, potential counterparties, ordering parties, appli-
cation promoters, product sponsors and products have their
authority to operate. Finally, consideration/entitlement
transfer entities can monitor and maintain up-to-date rules
with respect to ordering parties, counterparties, application
promoters, product sponsors, counterparty-guarantors, and
regulators they are and are not prepared to deal with—
individually and by type.

Ordering Party Requirements

For their operation, CONTRACT APPS require primary
product ordering party stakeholders to a CONTRACT APP,
in registering an order for a product of their choice, to
specify: the above-described "product type" and "other
stakeholder involvement" information; multiple attributes of
the specific order they are seeking; their interest or otherwise
in being granted credit by potential counterparties for their
contract consideration amount, or in availing themselves of
the possible netting and collateralisation features of the APP
concerned; the maximum (and possibly minimum) consid-
eration "price" they are prepared to pay for their defined
product; and various other dimensions of their needs, where
these include: the name/title by which they wish to be
identified by other APP stakeholders; the time at which they
wish their order to be submitted; the period of time after an
order has been submitted that they wish the order to be
retained before it is automatically withdrawn; whether or not
they are prepared to accept partial matches of their order; the
degree of market transparency they wish to be exposed to;
whether or not they wish wish to have the option of trading
a matched contract on an authorised INVENTCO secondary
market (See Process 5 description below); whether or not
they wish to manually consider/authorise potential counter-
party quotes on an order; in the case where potential
counterparty quotes are required to be manually considered/
authorised, the maximum time after potential counterparty
quote details are provided to the ordering party that the
ordering party wishes to consider the quote(s); and the
consideration/entitlement transfer entity accounts from
which/to which they wish to have relevant "payments"
made/received.

The above-mentioned multiple attributes of a specific
primary order an ordering party-is seeking include: their
wish or otherwise to directly input the entitlement "coordi-
nates" of their desired contingent claim order; their wish or
otherwise to mathematically specify an entitlement function
reflecting their desired product order, where such functions
can be single or multidimensional (indicating a contingent
contract entitlement conditional on two or more
phenomena); the "consideration/entitlement unit", "cur-
rency" (if applicable), and "national currency" (if
applicable) in which they wish to "pay"/"receive" their
contract consideration/entitlement. Where an ordering party
wishes to mathematically specify their desired primary
product order as a single-dimensional entitlement function:
the input term "X" can indicate the number of contract
entitlement "inflection points" the ordering party is seeking
within the allowable range of future product event values
(including the value range extremity points); the input term
"Alpha (X)" can indicate the ordering party-specified event
value corresponding to the Xth future product event value
contract entitlement inflection point; the input term "Beta
(X)" can indicate the ordering party-specified desired

entitlement amount (in the desired "consideration/ entitlement form", "currency" and "national currency" entitlement denomination) corresponding to the Xth event value inflection point; and the input term "Gamma (X-1)" can indicate the ordering party-specified desired shape of the function between each of the co-ordinates: [Alpha (1), Beta (1)] and [Alpha (2), Beta (2)], [Alpha (2), Beta (2)] and [Alpha (3), Beta (3)], and so on (as applicable), where Gamma can represent all possible, mathematically definable, shapes.

Potential Counterparty Requirements

For their operation, CONTRACT APPS also require primary product "potential counterparty" stakeholders to a CONTRACT APP to define various parameters on the basis of which they can automatically price orders, including parameters with which they wish to establish a "consideration bid" on a defined product order; possible individual contract and product constraints they require to be satisfied if they were to become a counterparty to a defined product ordering party order; and possible expected-value product-portfolio constraints they require to be satisfied if they were to become a counterparty to a defined product ordering party order.

In defining parameters with which they wish to establish a "consideration bid" on a defined product order under a "EV-CE" pricing regime (described above), each potential counterparty is required to specify, amongst other things: an indicator of the appropriate "defined circumstances" of all possible product orders; a base "commission rate"; a base "discount rate"; (if applicable), a set of base "consideration/ entitlement denomination", "currency" and "national currency" exchange rates; base "unit product prices"; and desired adjustments to the base commission rate, discount rate, exchange rates, and unit product prices on specific product orders according to the determined-value of the "defined circumstances" indicator (based on a specific product order).

Possible individual contract and product constraints the potential counterparty requires to be satisfied if they were to become a counterparty to a defined product ordering party order, include: an absolute loss limit constraint (this constraint being specified as a single-figure constraint and/or as a function constraint); an expected loss limit constraint (this constraint defining the maximum "expected" aggregate loss the potential counterparty is prepared to incur on a contract/ product, taking into account their assessment of the likelihood of all feasible future product values occurring); and a constraint on the maximum proportion of the expected total loss of the aggregate of the potential counterparty's contracts/products that can be accounted for by the expected loss of the defined individual contract/product. Similarly, possible expected-value product-portfolio constraints the potential counterparty requires to be satisfied if they were to become a counterparty to a defined product ordering party order include the maximum (and possibly minimum) proportion of the expected total loss of the aggregate of the potential counterparty's product portfolio that can be acccounted for by the expected loss of an individual contract/product.

Communications

CONTRACT APP stakeholders communicate with their applicable APP via AXSCO. Individual "stakeholder-to/ from-AXSCO" communications can be by way of any/all of the following: voice communications with an AXSCO-linked "live operator" or "recorded messaging" system; touch-telephone communication with AXSCO directly; or computer-to-computer link with AXSCO (via a dedicated or

dial-up communications line). With all three forms of communication, CONTRACT APP stakeholders may be required to utilize specified computer hardware and/or software mechanisms in their communications with AXSCO (including "payments" authorisation "black box" devices referred to below).

Component Processes

In their manifestation as telecommunications/computer software residing on telecommunications/computer hardware, individual CONTRACT APPS consist of a cluster of processes, utilizing a number of data files, residing on one or more processing units. A cluster of nine (and potentially more or fewer) specific processes and their related data files reside within a CONTRACT APP: a process handling file administration and updating tasks supporting all other processes (termed Process 1); a process handling the receipt and processing of "primary" risk management contract transactions (termed Process 2); a process handling the receipt and processing of "secondary" risk management contract transactions (termed Process 3); a process handling the receipt and processing of "derivative-primary" risk management contract transactions (termed Process 4); a process handling the receipt and processing of "derivative-secondary" risk management contract transactions (termed Process 5); a process handling the "back office" management of all four types of risk management contract transactions (termed Process 6); a process handling non-transaction related consideration, entitlement, and other "payment" obligation transfers between stakeholders (termed Process 7); a process handling CONTRACT APP (and other INVENTCO) stakeholder access to specialist systems to assist these stakeholders decide how best to interface with the multiple aspects of INVENTCO (termed Process 8); and a process handling CONTRACT APP (and other INVENTCO) stakeholder access to a range of INVENTCO-facilitated "value added services" (termed Process 9). These processes may function concurrently.

DESCRIPTION OF CONTRACT APP PROCESSES

Process 1

Process 1 handles file administration and updating tasks supporting all other processes (FIG. 18). The PRODUCT, PRODUCT TRANS, DEAL LIST and DEAL LIST TRANS files referred to in FIG. 18 are applicable, individually or collectively, to primary, secondary, derivative-primary, and derivative-secondary contract orders. The SEL PRICE, SEL PRICE TRANS, SEL LIMIT and SEL LIMIT TRANS files are applicable only to primary and derivative-primary contract orders. The TRADE PRICE, TRADE PRICE TRANS, TRADE LIMIT and TRADE LIMIT TRANS files are applicable only to secondary and derivative-secondary contract orders.

The file administration and updating tasks handled by Process 1 comprise: dealing with general data-file information received from CONTRACT APP stakeholders; dealing with general data-file and order processing information received from relevant other INVENTCO stakeholders, particularily VIRPRO and AXSCO; dealing with trading support information received directly from CONTRACT APP stakeholders; dealing with potential counterparty primary, and derivative primary, product order "consideration bid" parameters and order-match constraints; dealing with existing-contract offering party secondary, and derivative secondary, order match conditions; and dealing with miscellaneous information from entities external to INVENTCO.

Existing and prospective stakeholders are required to supply their applicable CONTRACT APP with specified

identification and other information, and to continually maintain the integrity of this information. For each stakeholder, this information includes: applicable name(s), addresses, contact numbers, and references; their desired system access medium; their consideration/entitlement transfer entity account details; and, if applicable, their required schedule of fees and charges payable by other INVENTCO stakeholders. This information is maintained in the data file ADMIN, updated information being received by way of the transaction file ADMIN TRANS.

VIRPRO is required to supply the applicable CONTRACT APP with various forms of general data-file information Including: identification data relating to the application promoter for (each) CONTRACT APP; details of the permitted types of system access mediums; and consideration/entitlement denominations available in each application. Again, this information is maintained in the data file ADMIN, updated information being received by way of the transaction file ADMIN.TRANS.

VIRPRO is similarly required to supply the applicable CONTRACT APP with various forms of general data-file information including: information on all data received by and sent from the various parts of INVENTCO to one another and to entities external to INVENTCO; and statistical information of various types, including data traffic volumes, data file location information and so on. This information is continuously collected by AXSCO and maintained in the data file HISTORY.

Trading support information received directly from CONTRACT APP stakeholders comprises stakeholder relationship information of a general nature, and specific information from individual stakeholders.

Stakeholder relationship information of a general nature comprises "transaction communication parameters" and automatic/manual deal and no deal "flags". Transaction communication parameters are parameters set by all (registered) CONTRACT APP stakeholders defining the bounds within which they wish, for security reasons, all of their communications within INVENTCO to fall. Automatic/manual deal and no deal flags are "flags" set, as required, by all (registered) CONTRACT APP stakeholders indicating their requirements with respect to dealing with other CONTRACT APP stakeholders. This information is maintained in the data file DEAL LIST, updated information being received by way of the transaction file DEAL LIST TRANS.

Specific information from individual stakeholders differs according to the category of stakeholder involved.

Application promoters provide, amongst other things: Information for the data file, PRODUCT (updated transactions being received from the file, PRODUCT TRANS), and further information for the data file ADMIN (updated transactions being received from the file, ADMIN TRANS). Information for the data file, PRODUCT includes details of the specific products application promoters offer for trading/exchange/transfer. Information for the data file, ADMIN includes: the order pricing and matching process upon which the application is based; the consideration/entitlement "value date" regime upon which their application is based; the categories of other stakeholders allowed to participate in the application and the conditions under which they can do this; the specific rules of engagement of counterparty-guarantors by potential counterparties; the availability and, in turn, the terms and conditions for CONTRACT APP stakeholder utilization of "consideration credit", "collateralisation", and "netting" features of the application (embodied in the various post-order-processing manage-

ment routines); and details of the consideration/entitlement transfer entities involved in the application and relevant security information concerning account access.

Product sponsors provide full details of the product(s) they are sponsoring; product ordering parties and potential counterparties (collectively) indicate, with respect to each other, the parties they either prefer to deal with or wish to deal with exclusively. Potential counterparties (exclusively) provide a variety of specific information, including: details of the Application promoter, Product sponsor, and Counterparty-guarantor rules under which they have chosen to operate; data recording the lines of credit (if any) offered to ordering parties and the general and specific terms and conditions of these credit lines (applicable to ordering parties individually and/or to defined classes of ordering parties); parameters with which a potential counterparty wishes to determine its consideration "bids" on orders. Counterparty-guarantors provide details of the potential counterparties (if any) they have agreed to guarantee and the nature of such guarantees. Regulators provide details of: all entities having a stake in the application and their relationships to one another (for example, which counterparty-guarantors cover which counterparties, which potential counterparties offer which products, and so on); specific regulations developed for the regime; and parameters defining the taxation treatment of all types of orders and related transactions. Consideration/entitlement transfer entities provide "set-up" and on-going account access and balance-updating services. All of the above-described information is maintained in the data file, ADMIN, updated information being received by way of the transaction file ADMIN TRANS.

In dealing with potential counterparty primary product order "consideration bid" parameters and order-match constraints, potential product order counterparties are required, amongst other things, to: define various parameters with which they wish to establish a "consideration bid" on a defined product order; and define parameters with which the potential counterparty wishes to determine adjustments to the "base-price" bids on product orders according to the specific ordering party involved (this information is maintained in the data file SEL PRICE; updated information is received by way of the transaction files SEL PRICE TRANS); define possible individual contract and product constraints the potential counterparty requires to be satisfied if they are to become a counterparty to a defined product ordering party order; and define possible expected-value product-portfolio constraints the potential counterparty requires to be satisfied if they are to become a counterparty to a defined product ordering party order (these latter two categories of information are maintained in the data files SEL LIMIT and BUY LIMIT; updated information being received by way of the transaction file SEL LIMIT TRANS).

In dealing with existing-contract offering party secondary order match conditions, offering parties are required, amongst other things, to specify: the Order IDs of the contracts in which the entity concerned wishes to "sell" its position as a contract stakeholder, and, for each such contract, the pricing and other parameters it requires to be satisfied before a contract position "sale" is effected. This information is maintained in the data file TRADE PRICE; updated information is received by way of the transaction file TRADE PRICE TRANS.

In dealing with potential counterparty derivative-primary product order "consideration bid" parameters and order-match constraints, potential product order counterparties are required to provide essentially the same information

described above in relation to primary product orders. However, in addition, information directly applicable to the relevant type of derivative-primary transaction concerned (say, an option to establish a primary product order at a later date) is also required.

In dealing with existing-contract-offering party derivative-secondary order match conditions, offering parties are required to provide essentially the same information described above in relation to secondary product orders. However, in addition, information directly applicable to the relevant type of derivative-secondary transaction concerned (say, an option to sell a position in a primary product order at a later date) is also required.

In dealing with miscellaneous information from entities external to INVENTCO, this information can be of any type and may, potentially, be used by any part of INVENTCO; the information is maintained in the data-file ADMIN with updated information being received by way of the transaction file ADMIN TRANS

Process 2

Process 2 handles the receipt and processing of "primary" risk management contract transactions, such transactions being of multiple types. Various sub-processes of Process 2 handle the receipt and processing of all possible types of these transactions, including product order processing, price quote requests, and withdrawals of existing product orders.

Primary "product orders" constitute the core "primary" risk management contract transaction type (FIG. 19 provides a summary flow chart, and the document text provides a detailed flow chart and description of the processing of this transaction type).

Primary product orders incorporate the following key items of information: ordering party identification information; CONTRACT APP application and product identification information; "other stakeholder involvement" information; the ordering party's desired form of product specification (directly input as entitlement coordinates or as mathematical function(s)); when the order specification is by way of a single-dimensional mathematical function, the parameters of such a function (which can include: the term "X", the term "Alpha (X)", the term "Beta (X)", the term "Gamma (X-1)"; the contract consideration and entitlement "denomination type", "currency (if applicable)" and "national currency (if applicable)"; the ordering party's interest or otherwise in being granted credit by potential counterparties for the yet-to-be-determined contract consideration amount; the ordering party's interest or otherwise in availing themselves of the possible netting and collateralisation features of the APP concerned; the consideration "price" range within which the ordering party is prepared to "pay" for their defined product; miscellaneous other dimensions of the ordering party's needs, and the consideration/entitlement transfer entity accounts from which/to which they wish to have relevant "payments" made/received). Upon its receipt, all of this information is written to—and subsequently processed from—the file PORD NEW.

Three sub-processes are involved in processing primary product orders—order authorisation, order matching, and matched order confirmation. In the case of the anticipated most typical form of order, termed a "normal-automatic" primary product order these sub-processes function as follows:

The primary product order authorisation sub-process verifies that all orders contain data appropriate to the product being sought and that each ordering party is accurately identified and credentialled (this sub-process draws principally on the data-file, PRODUCT).

The primary product order matching sub-process locates the best possible counterparty(ies) for the ordering party's transaction according to the application promoter-specified "matching rules" embodied in the APP; it does this utilizing three component sub-processes, termed: short-listing of potential-counterparties, individual potential-counterparty "pricing" calculations, and counterparty selection.

The "short-listing of potential counterparties" sub-process component establishes a list of potential counterparties (if any) willing to offer the product sought by the ordering party, upon their receipt from the ordering party of a consideration they deem to be appropriate (this sub-process draws principally on the data-file, PDEAL LIST).

The individual potential-counterparties pricing calculations sub-process component utilises the above-described pricing parameters re-specified by each short-listed potential counterparty to calculate the "bid" each of them is prepared to make on the ordering-party's product order (or part thereof), and to add these to the potential counterparties short-list file (this sub-process draws principally on the data-file, PSEL PRICE).

The "counterparty selection" sub-process component extracts from the above-described "potential-counterparties short-list" file the best possible counterparty(ies) for the ordering party's transaction, according to the application promoter-specified "matching rules" embodied in the APP, taking into account whatever matching constraints all applicable APP stakeholders may have prespecified. This selection being made, and the price bid being within the allowable limits specified by the ordering party, and there being no requirements for manual-approval intervention by any relevant stakeholder, a matched order is deemed to be in existence (this sub-process draws principally on the data-file, PSEL LIMIT).

The matched order confirmation sub-process effectively secures, automatically, the positive agreement of all affected stakeholders to the contract, including confirmation of the product ordering party's ability to immediately pay (or be granted counterparty credit, or ordering party guarantor credit, for) the required contract consideration (and possible other applicable fees). Automatic approvals of contracts are made by the CONTRACT APP electronically transferring resources recorded in the ordering party's applicable consideration/entitlement transfer entity account to the account of the applicable counterparty (See Appendix H for a description of the consideration/entitlement "payment" process). In turn, automatic updates of the counterparty's matching constraints maintained in the file PSEL LIMIT are made.

Upon completion of the above-described processing steps: unmatched order transactions are written to the file, PORD QUEUE, for subsequent match attempts; matched and confirmed order transactions are confirmed to the relevant CONTRACT APP stakeholders (this process drawing principally on the data-file, ADMIN) and are written to the file PORD CONF for subsequent "back-office" processing; and relevant CONTRACT APP stakeholders are notified of rejected orders (again, this process drawing principally on the data-file, ADMIN), records of this being written to the file PORD REJ for subsequent "back-office" processing. A copy of all processing outputs is written to the file, HISTORY.

Process 3

Process 3 handles the receipt and processing of "secondary" risk management contract transactions. Like "primary" risk management contracts, "secondary" risk management contracts are of multiple types; various sub-processes of

Process 3 handle the receipt and processing of all possible types of these transactions, including product order processing, product price indications, and withdrawals of existing product orders.

"Secondary product orders" constitute the core "secondary" risk management contract transaction type (FIG. **20** provides a summary flow chart of the processing of this transaction type).

"Secondary" product orders incorporate the following key items of information: potential acquiring party identification information; the pre-established Order ID reference to the sought-after primary contract; the potential acquiring party's interest or otherwise in being granted credit by offering parties for the yet-to-be-determined contract acquisition amount; the acquiring party's interest or otherwise in availing themselves of the possible netting and other features of the APP concerned; the acquisition "price" range within which the potential acquiring party is prepared to "pay" for the contract they have specified; other dimensions of the potential acquiring party's needs; and the consideration/entitlement transfer entity accounts from which/to which they wish to have "relevant payments" made/received. The above-described information is, upon receipt, written to—and subsequently processed from—the file SORD NEW.

Three sub-processes are involved in processing secondary product orders—order authorisation, order matching, and matched order confirmation. In the case of the anticipated most typical form of order, termed a "normal-automatic" secondary product order these sub-processes function as follows:

The secondary product order authorisation sub-process verifies that all orders contain data appropriate to the contract sought and that each potential acquiring party is accurately identified and credentialled (this sub-process draws principally on the data-file, SPRODUCT).

The secondary product order matching sub-process locates sought-after contract records and, based on the contents of these records, determines whether a "sale" of the position of the specified stakeholder in the contract to the potential acquiring party is possible—in particular, whether the acquisition "price" range within which the potential acquiring party has specified it is prepared to "pay" for the position of the specified current stakeholder is equal to, or in excess of, the "allowable sale price" figure prespecified by the applicable contract stakeholder. If a contract "sale" is found to be possible, and there being no requirements for manual-approval intervention by any relevant stakeholder, a "match" is deemed to have occurred.

The secondary product matched order confirmation sub-process effectively secures, automatically, the positive agreement of all affected stakeholders to the contract position "sale", including confirmation of the contract acquiring party's ability to immediately pay (or be granted current stakeholder credit, or acquiring party guarantor credit, for) the required "sale price" consideration (and possible other applicable fees). Automatic approvals of such "sales" are made by the CONTRACT APP electronically transferring resources recorded in the acquiring party's applicable consideration/entitlement transfer entity account to the account of the applicable current contract stakeholder.

Upon completion of the above-described processing steps: unmatched order transactions are written to the file, SORD QUEUE, for subsequent match attempts; matched and confirmed order transactions are confirmed to the relevant CONTRACT APP stakeholders (this process drawing principally on the data-file, ADMIN), required records being

written to the file SORD CONF for further "back-office" processing as required; and rejected order transactions are similarly notified to the relevant CONTRACT APP stakeholders (again, this process drawing principally on the data-file, ADMIN), required records being written to the file SORD REJ for further "back-office" processing. A copy of all processing outputs is written to the file, HISTORY.

Process 4

Process 4 handles the receipt and processing of "derivative-primary" risk management contract transactions. Like "primary" risk management contracts, "derivative-primary" risk management contracts are of multiple types; various sub-processes of Process 4 handle the receipt and processing of all possible types of these transactions, including product order processing, product price indications, and existing product order withdrawals.

"Product option orders" is one illustrative "derivative-primary" risk management contract transaction type (FIG. 21 provides a summary flow chart of the processing of this transaction type).

"Derivative-primary" product option orders incorporate the following key items of information: ordering party identification information; CONTRACT APP application and product identification information; "other stakeholder involvement" information; the ordering party's desired form of product specification (directly input as entitlement coordinates or as mathematical function(s)); when the order specification is by way of a single-dimensional mathematical function, the parameters of such a function (which can include: the term "X", the term "Alpha (X)", the term "Beta (X)", the term "Gamma (X-1)"; the contract consideration and entitlement "denomination type", "currency (if applicable)" and "national currency (if applicable)"; the ordering party's interest or otherwise in being granted credit by potential counterparties for the yet-to-be-determined contract option consideration amount; the ordering party's interest or otherwise in availing themselves of the possible netting and collateralisation features of the APP concerned; the consideration "price" range within which the ordering party is prepared to "pay" for their defined product option; miscellaneous other dimensions of the ordering party's needs, and the consideration/entitlement transfer entity accounts from which/to which they wish to have relevant "payments" made/received). Upon its receipt, all of this information is written to—and subsequently processed from—the file DPORD NEW.

Three sub-processes are involved in processing derivative-primary product orders—order authorisation, order matching, and matched order confirmation . In the case of the most likely form of the above-mentioned illustrative option order, termed a "normal-automatic" derivative-primary product option order these sub-processes function as follows:

The primary product option order authorisation sub-process verifies that all orders contain data appropriate to the product option being sought and that each ordering party Is accurately identified and credentialled (this sub-process draws principally on the data-file, DPPRODUCT).

The primary product option order matching sub-process locates the best possible counterparty(ies) for the ordering party's transaction according to the application promoter-specified "matching rules" embodied in the APP; it does this utilizing three component sub-processes, termed: short-listing of potential option-counterparties, individual potential option-counterparty "pricing" calculations, and option-counterparty selection.

The "short-listing of potential option-counterparties" sub-process component establishes a list of potential option-

counterparties (if any) willing to offer the product option sought by the ordering party, upon their receipt from the ordering party of an option consideration they deem to be appropriate (this sub-process draws principally on the data-file, DPDEAL LIST).

The "individual potential option-counterparties pricing calculations" sub-process component utilises the above-described pricing parameters prespecified by each short-listed potential option-counterparty to calculate the "bid" each of them is prepared to make on the ordering-party's product option order (or part thereof), and to add these to the potential option-counterparties short-list file (this sub-process draws principally on the data-file, DPSEL PRICE).

The "option-counterparty selection" sub-process component extracts from the above-described "potential option-counterparties short-list" file the best possible counterparty (ies) for the ordering party's transaction, according to the application promoter-specified "matching rules" embodied in the APP, taking into account whatever matching con-straints all applicable APP stakeholders may have prespeci-fied. This selection being made, and the price bid being within the allowable limits specified by the ordering party, and there being no requirements for manual-approval inter-vention by any relevant stakeholder, a matched option order is deemed to be in existence (this sub-process draws prin-cipally on the data-file, DPSEL LIMIT).

The matched option order confirmation sub-process effec-tively secures, automatically, the positive agreement of all affected stakeholders to the options contract, including con-firmation of the product-option-ordering party's ability to immediately pay (or be granted counterparty credit, or ordering party guarantor credit, for) the required option product consideration (and possible other applicable fees). Automatic approvals of contracts are made by the CON-TRACT APP electronically transferring resources recorded in the ordering party's applicable consideration/entitlement transfer entity account to the account of the applicable counterparty. In turn, automatic updates of the option-counterparty's matching constraints maintained in the file DPSEL LIMIT are made.

Upon completion of the above-described processing steps: unmatched option-order transactions are written to the file, DPORD QUEUE, for subsequent match attempts; matched and confirmed option-order transactions are con-firmed to the relevant CONTRACT APP stakeholders (this process drawing principally on the data-file, ADMIN) and are written to the reference file DP MSTR, and the file DPORD CONF for subsequent "back-office" processing; and relevant CONTRACT APP stakeholders are notified of rejected orders (again, this process drawing principally on the data-file, ADMIN), records of this being written to the file DPORD REJ for subsequent "back-office" processing. A copy of all processing outputs is written to the file, HIS-TORY.

If/when an option-holder wishes to exercise its option over a pre-established contract, it does so by appropriately notifying the CONTRACT APP which, in turn, retrieves the contract record from DPMSTR, effects the necessary addi-tional consideration payments, and writes a new record to PORD CONF for subsequent back office processing. As described above, the appropriate HISTORY and other files are updated in this process.

Process 5

Process 5 handles the receipt and processing of "derivative-secondary" risk management contract transac-tions. Like "secondary" risk management contracts, "derivative-secondary" risk management contracts are of

multiple types, various sub-processes of Process. 5 handle the receipt and processing of all possible types of these transactions, including product order processing, product price indications, and withdrawals of existing product orders.

"Product option orders" is an illustrative "derivative-secondary" risk management contract transaction type (FIG. 22 provides a summary flow chart of the processing of this transaction type).

"Derivative-secondary" product option orders incorporate the following key items of information: potential acquiring party identification information; the pre-established Order ID reference to the sought-after primary contract (in relation to which an option is to be purchased or sold); the potential acquiring party's Interest or otherwise in being granted credit by offering parties for the yet-to-be-determined option contract acquisition amount; the acquiring party's interest or otherwise in availing itself of the possible netting and other features of the APP concerned; the acquisition "price" range within which the potential acquiring party is prepared to "pay" for the contract option they have specified; other dimensions of the potential acquiring party's needs; and the consideration/entitlement transfer entity accounts from which/to which they wish to have relevant "payments" made/received. The above-described information is, upon receipt, written to—and subsequently processed from—the file DSORD NEW.

The subprocesses involved in the processing of derivative-secondary product option orders are essentially a combination of the processes described above in the case of secondary product orders (Process 3) and derivative-primary product option orders (Process 4). At the completion of the matching process, matched orders are written to the refer-ence file DSMSTR and the file DSORD CONF for subse-quent back office processing.

If/when an option holder wishes to exercise its option over a pre-established contract, it does so by appropriately notifying the CONTRACT APP which, in turn, retrieves the contract record from DSMSTR, effects the necessary addi-tional consideration payments, and writes a new record to SORD CONF for subsequent back office processing. As described above, the appropriate HISTORY and other files are updated in this process.

Process 6

Process 6 handles the "back office" management of "matched/confirmed" primary, secondary, derivative-primary, and derivative-secondary risk management con-tract transactions and transactions handled by Processes 7–9. The process incorporates multiple sub-processes, collec-tively accessing multiple data files (FIG. 23): primary risk management contract back office processing; secondary risk management contract back office processing; derivative-primary risk management contract back office processing; derivative-secondary risk management contract back office processing; "Process 7" transactions back office processing; "Process 8" transactions back office processing; and "Pro-cess 9" transactions back office processing.

In relation to the back-office management of confirmed/matched primary risk management contracts—a number of sub-processes are involved, including: Receipt of the pre-vious operating day's "matured-contract actual product event value" sub-process; "Start-of-day PAYACC manage-ment" sub-process; Contract maturity management sub-process; Confirmed contract processing sub-process; Infor-mation compilation and distribution sub-process; Information extraction from primary orders sub-process; Contract valuation sub-process; Contract collateralisation

payments sub-process; System Access and usage fee determination and payments sub-process; Bilateral obligations netting sub-process; Multilateral obligations netting sub-process; Bilateral payments netting sub-process; Multilateral payments netting sub-process; and "end-of-day PAY-ACC management" sub-process.

Receipt of the previous operating day's "matured-contract actual product event value" details. This sub-process is flowcharted in FIG. 24; it involves the applicable CONTRACT APP receiving "matured-contract actual product event value" details from the relevant product sponsors (external to INVENTCO). The primary data-file, MAT PROD VALUES, is updated with this information. The support data-files, ADMIN, HISTORY, and INFO are similarly updated with applicable information.

"Start-of-day" PAYACC management. This sub-process is flowcharted in FIG. 25; it involves the applicable CONTRACT APP receiving consideration/entitlement "actual account" opening-balances from participating consideration/entitlement transfer entities (external to INVENTCO) (see Process 7 for details). The primary data-files, PAYACC SHADOW and PAYACC FINAL are updated with this information. The support data-files, HISTORY, INFO and ADMIN, are similarly updated with applicable information.

Contract maturity management. This subprocess is flowcharted in FIG. 26; It involves the applicable CONTRACT APP determining and giving effect to primary and related entitlement-transfers to/from applicable CONTRACT APP stakeholders, applicable other INVENTCO stakeholders, where such transfers are principally reflected in entries to the data-file, PAYACC SHADOW. CONTRACT APP determines and gives effect to these transfers, principally by drawing upon product/contract information maintained in the data files, INTREG, MAT PROD VALUES, COLLAT, CREDIT MGMT, BILAT OBLIG NET, and MULTILAT OBLIG NET. These data-files are appropriately updated in the process as are the support data-files, ADMIN, HISTORY, TAX/SUB, PAYACC SHADOW and INFO.

Confirmed contract processing. This sub-process, flowcharted in FIG. 27, operates continually throughout each operating day. Details of new matched/confirmed contracts are read from the file PORD CONF and are then time-stamped and written to the file INTREG as two records—one record pertaining to the contract ordering party and the other to the contract counterparty. The support data files, INFO, ADMIN, and HISTORY are appropriately updated in the process.

Information compilation and distribution. This subprocess, flowcharted in FIG. 28, operates continually (beyond a defined operating day), drawing on the data-file INFO. As already described, INFO is updated continually as CONTRACT APP and other INVENTCO events occur, including pertinent AXSCO message information written in the first instance to HISTORY. All relevant INVENTCO stakeholders have access to preauthorised parts of INFO.

Information extraction from primary orders. This subprocess, flowcharted in FIG. 29, is effected after the completion of the defined operating day. Essentially, it involves the single task of processing the data-file, HISTORY, to yield pertinent information for the data-file INFO. One of the most important items of information drawn from HISTORY is (confidential) information on all of the prior day's potential counterparty consideration bid parameters, in particular the data items termed "assessed probabilities of occurrence". This information yields "market" information for the subsequent contract valuation sub-process.

Contract valuation. This sub-process, flowcharted in FIG. 30, draws principally upon the above-described "markets" information previously written to INFO. Pertinent data from this file is "applied against" all outstanding contracts maintained in INTREG, thereby yielding updated "future product value (FPV)", "expected value" and "distribution" value information for all contracts and, from this, revaluations of all future entitlement "expected values" and "distribution" values. All these revaluation figures are maintained in INTREG with applicable information also being written to INFO and HISTORY.

Contract collateralisation payments. This sub-process, flowcharted in FIG. 31, draws principally on the data-file INTREG. Following the contract valuation process, this collateralisation process involves relevant INTREG records being read and, depending (amongst other things) on the precalculated "present value" of the expected future entitlement associated with each relevant contract, a calculated portion of the present value of the expected future consideration amount is debited or credited to the PAYACC SHADOW file of the applicable collateralisation trustee entity, and the product ordering party and/or counterparty as is applicable.

Generally, if the most recent precalculated "present value" of the expected future entitlement associated with each relevant contract indicates a negative contract value, and if this negative value exceeds the prior contract valuation figure, the applicable entity's trust account is credited with the funds difference, with the entity's own consideration/entitlement transfer entity account being debited correspondingly. If this negative value does not exceed the prior contract valuation figure, the applicable entity's trust account is debited with the funds difference, with the entity's own consideration/entitlement transfer entity account being credited correspondingly. On the other hand, if the most recent precalculated "present value" of the expected future entitlement associated with each relevant contract indicates a positive contract value, the only collateralisation payment adjustment called for is one in which all funds (if any) in the applicable entity's trust account are transferred to the entity's own consideration/entitlement transfer entity account. In each of the above-described cases, a record of all entries effected is written to the data-file, COLLAT, and a subset of this information is written to the data-files HISTORY and INFO.

System Access and usage fee determination and payments. This subprocess, flowcharted in FIG. 32, deals with the determination and payment of system access and usage fees (as distinct from contract maturity date fee payments). The function draws principally on the data-files ADMIN, and HISTORY. Fee payment parameters are maintained in data-file ADMIN. These parameters are applied against the day's new records already written to HISTORY. Debits and credits for fees so determined are written to PAYACC SHADOW with summary information written to INFO and HISTORY.

Bilateral obligations netting. This subprocess, flowcharted in FIG. 33, effectively maintains an up-to-date matrix of the present values of expected future entitlement (and other) obligations between pairs of participating ordering parties and counterparties (as well as other participating CONTRACT APP and INVENTCO stakeholders), continually adjusted on the basis of required current consideration, entitlement and other payments/receipts as they occur. As required, the function updates the above-described matrix in two stages. First, with the most recent contract revaluation figures contained within INTREG. And second, with the

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end-of-day payment/receipt amounts contained within PAY-ACC SHADOW. Consideration/entitlement transfer entity transfers from/to applicable entities are determined (according to the application-promoter specified parameters for so doing) on the basis of whether or not any/all of the adjusted bilateral present value figures are in excess of their allowable limits. These entries are written to PAYACC SHADOW, with the data-files BILAT OBLIG NET, INTREG, HISTORY, and INFO being subsequently updated.

Multilateral obligations netting. This subprocess, flowcharted in FIG. 34, is essentially the same as the bilateral netting function except that a specified "clearing/trustee" entity is effectively interposed between all bilateral counterparties and, as such, netted obligations are only between the specified "clearing house/trustee" entity and each participating entity.

Bilateral payments netting. This subprocess, flowcharted in FIG. 35, is independent of the above-described bilateral and multilateral obligations netting subprocesses. The subprocess operates by producing a matrix of bilaterally netted payments/receipts based on records contained in the data-file, PAYACC SHADOW. Single netted payment/receipt figures are then rewritten to PAYACC SHADOW, with the data-files BILAT PYMTS NET, ADMIN, HISTORY and INFO being subsequently updated.

Multilateral payments netting. Like bilateral payments netting, this subprocess, flowcharted in FIG. 36, is independent of the above-described bilateral and multilateral obligations netting subprocesses. The subprocess operates by producing a matrix of bilaterally netted payments/receipts to/from the applicable "clearing house/trustee" entity based on records contained in the data-file, PAYACC SHADOW. Single netted payment/receipt figures (to/from the "clearing house/trustee" entity) are then rewritten to PAYACC SHADOW, with the data-files MULTILAT PYMTS NET, ADMIN, HISTORY and INFO being subsequently updated.

"End-of-day" PAYACC management. This subprocess, flowcharted in FIG. 37, involves a three-stage process. First, the preparation of inter-consideration/entitlement transfer entity "balancing" transactions. Second, the transfer of the final contents of the PAYACC SHADOW data-file to the data-file, PAYACC FINAL. And third, the electronic transmission of the contents of PAYACC FINAL to the applicable consideration/entitlement transfer entities (external to INVENTCO). In turn, the subsidiary data-files, ADMIN, HISTORY, and INFO are updated.

Process 7

Process 7 handles non-CONTRACT APP-related obligation transfers between applicable INVENTCO stakeholders, that is, the transfer of ownership title over "assets" registered by INVENTCO—typically matched/confirmed contracts (recorded as CONTRACT APP INTREG records) and consideration/entitlement transfer entity resources (recorded as PAYACC records). Both of the above-mentioned items have value to their holder. This process enables holders of these items to assign or lend any portion of their holdings to others at their will through initiating the appropriate transactions as NCAROT TRANS. The process accesses a relatively small number of data files (See FIG. 38). NCAROT TRANS received result in appropriate updates to the primary data-files, PAYACC SHADOW and INTREG. In turn, the subsidiary data files, HISTORY, ADMIN and INFO are updated.

Process 8

Process 8 (flowcharted in FIG. 39) handles CONTRACT APP (and other INVENTCO) stakeholder shared-access to

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specialist systems to assist them decide how best to interface with one or more aspects of INVENTCO. In the case of CONTRACT APP stakeholders, the most likely users of this process, one collection of such specialist systems are termed "decision support systems". The purpose of these systems is to guide a user-stakeholder as to how it should react to/deal with the continually changing circumstances within the CONTRACT APP with which they are dealing. Different clusters of systems are applicable for different CONTRACT APP stakeholders. These systems involve a hierarchy of potentially any number of value-added components.

An example of one such system, useful to primary product ordering parties, is a system which helps an ordering party determine which of its prespecified, but as yet un-matched, orders it should withdraw and which of its potential new product orders it should submit. This system is in the form of a "utility optimization" mechanism which seeks to identify the best possible composition of outstanding orders (and thus, which existing, unmatched orders should be withdrawn and which new orders should be submitted) based on two things. First, an objective function which seeks to minimize the difference between a weighted sum of actual and desired values of a series of attributes (involving single or multiple products, covering the ordering party's "real business exposure" to each product, the ordering party's portfolio of contracts which have been "matched" but are not yet confirmed, orders which have been submitted but not yet matched, and potential yet-to-be-submitted orders (collectively termed the "buyer's objective portfolio"), these attributes including, amongst other things: the "expected value" of the objective portfolio; the "standard deviation" of the objective portfolio; the "incremental cash outflow" attribute of the objective portfolio; the "maximum absolute loss" attribute of the objective portfolio; the "expected loss" attribute of the objective portfolio; the "implied minimum return on investment" of the objective portfolio; and the "implied expected return on investment" of the objective portfolio. And second, a series of constraints specifying, amongst other things: the required "minimum values" of each objective function attribute; and required minimum product-shares in the ordering party's overall product portfolio. The mathematical form of this "optimization" could take any of a number of alternative forms.

An optimization mechanism similar to the one described above can also aid potential counterparties in defining their pricing parameters for application against incoming product orders.

Effectively, systems of the above-described type are collectively maintained as a software "library" within the applicable CONTRACT APP (although they may also be loaned by VIRPRO-authorised entities independent of INVENTCO and/or acquired by VIRPRO-authorised parties whether they are INVENTCO stakeholders or not). CONTRACT APP (and other INVENTCO) stakeholder requests to make use of software within this library are received by way of records in the file, SSA TRANS. These requests result in the appropriate records in the file SSA being accessed and made available for use via AXSCO and the applicable entity's authorised electronic link to INVENTCO. Appropriate records of the utilization of SSA records are written to the data-files HISTORY, ADMIN and INFO.

Process 9

Process 9 (flowcharted in FIG. 40) handles CONTRACT APP (and other INVENTCO) stakeholder shared-access to a range of INVENTCO-facilitated value added services. These services can include: accounting, reconciliation, and

information services; value added information reseller services; financial services of multiple types; and data processing and telecommunications services. Effectively, software relating to these services is maintained as a software "library" within the applicable CONTRACT APP (although they may also be loaned by VIRPRO-authorised entities independent of INVENTCO and/or acquired by VIRPRO-authorised parties whether they are INVENTCO stakeholders or not). CONTRACT APP (and other INVENTCO) stakeholder requests to make use of software within this library are received by way of records in the file, VAS TRANS. These requests result in the appropriate records in the file VAS being accessed and made available for use via AXSCO and the applicable entity's authorised electronic link with INVENTCO. Appropriate records of the utilization of VAS records are written to the data-files HISTORY, ADMIN and INFO.

RISK MANAGEMENT CONTRACTS

Risk management contracts is a term used to refer to one type of contractual obligation which can be, but does not need to be, traded/exchanged/transferred, and subsequently processed and settled, using an INVENTCO system. Risk management contracts consist of "primary" risk management contracts; "secondary" risk management contracts; "derivative-primary" risk management contracts; and "derivative-secondary" risk management contracts.

"Primary" risk management contracts can be "simple" and "complex" in nature ("simple" contracts being derivatives of "complex" contracts).

A "simple" primary risk management contract is a tradeable or untradeable contract conveying an obligation on an entity, upon that entity being granted a consideration by another entity (or accepting a pledge to be granted a consideration by the other entity), to make an entitlement to that other entity depending on the value of a defined phenomenon, determined at a defined time in the future.

A "complex" primary risk management contract is a tradeable or untradeable contract conveying an obligation on either or both of two entities, upon one entity [usually] being granted a consideration by the other entity (or accepting a pledge to be granted a consideration by the other entity), to make an entitlement to pay/receive an entitlement from one another, depending on the value of a defined phenomenon, determined at a defined time in the future. A "complex" contract may, in turn, be "basic" or "advanced" in nature: a "complex-basic" contract being one that does not involve ordering party and/or matched order counterparty "collateralisation payments" to a third-party trustee or clearing entity during the life of a contract; and a "complex-advanced" contract being one that does involve ordering party and/or matched order counterparty "collateralisation payments" to a third-party trustee or clearing entity during the life of a contract.

"Secondary" risk management contracts are pre-existing "primary" risk management contracts offered for trade (individually or as a portfolio) by a "risk-counterparty" stakeholder to the underlying contract.

"Derivative-primary" risk management contracts are options contracts, or futures contracts, or forward contracts, or forward rate agreements, or swaps, or like financial instruments based on specified, but yet-to-be-established, primary risk management contracts.

"Derivative-secondary" risk management contracts are options contracts, or futures contracts, or forward contracts, or forward rate agreements, or swaps, or like financial

instruments based on pre-existing primary risk management contracts (which may have been traded since they were first established), including instruments based on: specified, but yet-to-be established, secondary risk management contracts; and the intended tertiary trading/exchange/transfer of specified, established, secondary risk management contracts.

PROCESS 2 VARIABLES AND DATA FILES

Listed below is the file name and description therefor.

Order Data Fields

OID Unique identification assigned by CONTRACT APP to every new order submitted.

BID Ordering party identification.

BREF Ordering party's own reference for this order.

PID Order field specifying the required product.

PMAT Product maturity date.

PC/ED Product consideration/entitlement denomination.

PCUR Product currency denomination.

PNCUR Product national currency denomination.

PPARAM Product specification parameters (e.g. minimum value (PMIN), maximum value (PMAX), and the step size (PSTEP)).

MAXCONSID Maximum consideration the ordering party will pay for this contract.

PAYFUNC Pay-off function type, contingent on one or more index variables.

PAYPARAM Parameters associated with the PAYFUNC.

ACC CONSID The ordering party account the consideration is to be paid from. Implied is the account consideration/entitlement, currency, national currency.

ACC ENTITL The ordering party account the contract entitlement is to be paid into. Implied is the account consideration/entitlement, currency, national currency.

RET LIM Retention time limit for the order, which sets an expiration time for the order whilst remaining un-matched.

OPRICE Price calculated and selected for this order (this value will be the matching price).

SPRICE Counterparty identification with which the order was matched.

PAY TRAN Payment transaction number.

DCID Defined circumstances identification.

OANON Anonymous flag, set by the ordering party when seeking to avoid manual authorisation requests by other stakeholders.

OMANUAL Manual authorisation request flag. If set, the ordering party requires manual authorisation before the matched order is fully confirmed.

DTID Deal type identification which codes a combination of miscellaneous flags such as collateralisation, bilateral and multilateral netting requirements.

Counterparty Short List Arrays

PRICEFUNC(SID) Pricing function: function type and associated parameters.

ELFUNC(SID) Expected loss determination function: function type and associated parameters.

EVFUNC(SID) Expected value determination function: function type and associated parameters.

CR(SID) Commission rate to be used for the current defined circumstances.

DR(SID) Discount rate to be used for the current defined circumstances.

PRICE(SID) Price calculated by each counterparty.

EL(SID) Expected loss calculated for the current order by each counterparty.

AL(SID) Absolute loss calculated for the current order by each counterparty.

EV(SID) Expected values determined for the current order by each counterparty.

MCC(SID) Maximum composition any contract (as an expected loss) can have of the entire portfolio.

MC(SID) Maximum composition the product (as an expected loss) can have of the entire portfolio.

ELL1(SID) Order expected loss limit.

ELL2(SID) Expected loss limits set by the counterparty for the product.

ELL3(SID) Expected loss limits set by the counterparty for equivalent maturity date products.

ELL4(SID) Expected loss limits set by the counterparty for same month maturity products.

ELL5(SID) Expected loss limits set by the counterparty for orders in all products.

CEL2(SID) Current accumulated expected losses for the product.

CEL3(SID) Current accumulated expected losses for equivalent maturity date products.

CEL4(SID) Current accumulated expected losses for same month maturity products.

CEL5(SID) Current accumulated expected losses for orders in all products.

ALL1(SID) Absolute loss limit function for each contract.

ALL2(SID) Absolute loss limit function set for the product.

CAL2(SID) Current absolute limit function accumulated for the product.

EVL1(SID) Expected value limit on each order.

C-C/EDXCHANG(SID) Counterparty consideration/entitlement denomination exchange rates which convert the ordering party's consideration denomination of ACC CONSID (and MAXCONSID) into the product's consideration denomination.

C-CXCHANG(SID) Counterparty currency exchange rates which covert the ordering party's currency of ACC CONSID (and MAXCONSID) into the product's denominated currency.

C-NCXCHANG(SID) Counterparty national currency exchange rates which convert the ordering party's national currency of ACC CONSID (and MAXCONSID) into the product's denominated national currency.

E-C/EDXCHANG(SID) Counterparty consideration/entitlement denomination exchange rates which convert the ordering party's consideration denomination of ACC ENTITLinto the product's consideration denomination.

E-CXCHANG(SID) Counterparty currency exchange rates which covert the ordering party's currency of ACC ENTITL into the product's denominated currency.

E-NCXCHANG(SID) Counterparty national currency exchange rates which convert the ordering party's national currency of ACC ENTITL into the product's denominated national currency.

Miscellaneous Variables

BPRICE Best price selected from the PRICE(SID) array.

SID The currently selected or viewed counterparty identification.

INDEX Index counter variable required for calculating order prices.

P1 Value calculated by a pricing function at an index point.

P2 Value calculated by a pay-off function at an index point.

Master Files

FILE DESCRIPTION/CONTENTS

PORD NEW Holds details of all new orders submitted by ordering parties:

BID Ordering party identification.

BREF Ordering party's own reference for this order.

PID Order field specifying the required product.

MAXCONSID Maximum consideration the ordering party will pay for this contract.

PAYFUNC Pay-off function type, contingent on one or more index variables.

PAYPARAM Parameters associated with the PAYFUNC.

ACC CONSID The ordering party account the consideration is to be paid from.

ACC C/ED The ordering party account consideration/entitlement.

ACC CUR The ordering party account currency.

ACC NCUR The ordering party account national currency.

ACC ENTITL The ordering party account the contract entitlement is to be paid into.

RET LIM Retention time limit for the order, which sets an expiration time for the order whilst remaining un-matched.

OANON Anonymous flag, set by the ordering party when seeking to avoid manual authorisation requests by other stakeholders.

OMANUAL Manual authorisation request flag. If set, the ordering party requires manual authorisation before the matched order is fully confirmed.

DTID Deal type identification which codes a combination of miscellaneous flags such as collateralisation, bilateral and multilateral netting requirements.

PORD QUEUE This master file holds details of orders which have already been authorised, and have attempted to match once before. Fields as in ORD NEW plus some additional fields:

OID Unique identification assigned by P-CONTRACT to every new order submitted.

PMAT Product maturity date.

C/ED Product consideration/entitlement denomination.

PCUR Product currency denomination.

PNCUR Product national currency denomination.

PPARAM Product specification parameters (e.g. minimum value (PMIN), maximum value (PMAX), and the step size (PSTEP)).

DCID Defined circumstances identification.

PORD REJ All rejected orders reside in this file. Fields as in ORD QUEUE plus some additional fields:

ERRCODE Error code indicating why the order was rejected.

PORD CONF When an order is matched and fully confirmed, full details are stored in this master file. Fields as in ORD QUEUE plus some additional fields:

OPRICE Price calculated and selected for this order. This value will be the matching price.

SPRICE Counterparty identification with which the order was matched.

PAY TRAN Payment transaction number.

PPRODUCT This master file holds information (definition details) about each product known to the system:

PID Product identification.

PMAT Product maturity date.

PC/ED Product consideration/entitlement denomination.

PCUR Product currency denomination.

PNCUR Product national currency denomination.

PPARAM Product specification parameters (e.g. minimum value (PMIN), maximum value (PMAX), and the step size (PSTEP)).

PDEAL LIST This file holds a list of the ordering party/product/counterparty tuples of allowable deals to occur. Thus by specifying an ordering party (BID) and product (PID), a list of counterparties who are prepared to enter into a deal with the ordering party/product combination, can be obtained:

BID Ordering party identification

PID Product identification

SID Counterparty identification

ANON All stakeholder identifications requiring anonymous confirmation.

MANUAL All stakeholder identifications requiring manual authorisation

PSEL DC This file allows counterparties to define identifications for sets of potential order parameters. Any order data field can be used to define an order. Each defined circumstance identification is then used to set unique pricing parameters:

DCID Defined circumstances identifications.

BID Ordering party identification

PAYFUNC Pay-off function type, contingent on one or more index variables.

PAYPARAM Parameters associated with the PAYFUNC.

ACC CONSID The ordering part account the consideration is to be paid from.

ACC ENTITL The ordering party account the contract entitlement is to be paid into.

DTID Deal type identification.

PC/ED Product consideration/entitlement denomination.

PCUR Product currency denomination.

PNCUR Product national currency denomination.

PSEL PRICE Contains all counterparty pricing parameters, including commission rates, discount rates and exchange rates:

SID Counterparty identification

PID Product identification

DCID Defined circumstances identification

PRICEFUNC Pricing function: function type and associated parameters.

CR Commission rate to be used for the current ordering party in the current product.

DR Discount rate to be used for the current ordering party in the current product.

C-C/EDXCHANG Counterparty consideration/entitlement denomination exchange rates which convert the ordering party's consideration denomination of ACC CONSID (and MAXCONSID) into the product's consideration denomination.

C-CXCHANG Counterparty currency exchange rates which covert the ordering party's currency of ACC CONSID (and MAXCONSID) into the product's denominated currency.

C-NCXCHANG Counterparty national currency exchange rates which convert the ordering party's national currency of ACC CONSID (and MAXCONSID) into the product's denominated national currency.

E-C/EDXCHANG Counterparty consideration/entitlement denomination exchange rates which convert the ordering party's consideration denomination of ACC ENTITL into the product's consideration denomination.

E-CXCHANG Counterparty currency exchange rates which covert the ordering party's currency of ACC ENTITL into the product's denominated currency.

E-NCXCHANG Counterparty national currency exchange rates which convert the ordering party's national currency of ACC ENTITL into the product's denominated national currency.

PSEL LIMIT Holds all counterparty portfolio limits and current accumulated exposures in the various mathematical forms allowed by the system:

SID Counterparty identification

PID Product identification

DATE Product maturity date.

MCC Maximum composition any contract (as an expected loss) can have of the entire portfolio.

MC Maximum composition the product (as an expected loss) can have of the entire portfolio.

ELL1 Order expected loss limit.

ELL2 Expected loss limits set by the counterparty for the product.

ELL3 Expected loss limits set by the counterparty for equivalent maturity date products.

ELL4 Expected loss limits set by the counterparty for same month maturity products.

ELL5 Expected loss limits set by the counterparty for orders in all products.

CEL2 Current accumulated expected losses for the product.

CEL3 Current accumulated expected losses for equivalent maturity date products.

CEL4 Current accumulated expected losses for same month maturity products.

CEL5 Current accumulated expected losses for orders in all products.

ALL1 Absolute loss limit function for each contract.

ALL2 Absolute loss limit function set for the product.

CAL2 Current absolute limit function accumulated for the product.

EVL1 Expected value limit on each order.

PAYACC Payment accounts for all registered stakeholders (inc. balances and previous SHADOWtransactions), are stored in this master file:

ID Stakeholder identification.

NO Account number.

ACC C/ED The ordering party account consideration/entitlement.

ACC CUR The ordering party account currency.

ACC NCUR The ordering party account national currency.

BALANCE Available funds.

GID Stakeholder identification guaranteeing the account.

I claim:

1. A computer-based data processing system to enable the formulation of customized multi-party risk management contracts having a future time of maturity, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a range of future outcomes, and said contract data specifying entitlements due at maturity for said range of future outcomes, and a consideration due to a counter-party stakeholder;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data, independent of said stakeholder entering said contract data, as to a likelihood of each outcome in said range of future outcomes for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each said counter-party stakeholder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing and matching contracts from said contract data and said registering data, said pricing including calculating a counter-consideration derived from said likelihoods and said entitlements, and said matching including comparing said consideration and said counter-consideration to match an offered contract with at least one of said counter-party stakeholders.

2. The system as in claim 1, further comprising at least one other-stakeholder input means linked with the data storage means, and by which phenomena and associated range of outcomes can be input to be stored in the data storage means to be ones of said predetermined phenomena and said range of future outcomes therefor.

3. The system as in claim 2, wherein each other-stakeholder input means is configured so that each said predetermined phenomenon and associated range of future outcomes further include a predetermined time of maturity, and said contract data and said registering data are for the time of maturity.

4. The system as in claim 2 or claim 3, wherein said registering data for each outcome represents a probability of that outcome eventuating at the time of maturity, and said counter-consideration is calculated by elemental multiplication of entitlements and the respective likelihood, all summed over the range, and adjusted at least to calculate the present day value thereof.

5. The system as in claim 4, wherein the said other-stakeholder input means is configured to receive updating data as to a present day outcome of each of the phenomena, in turn to be passed to the data storage means for recordal.

6. The system as in claim 5, wherein, on maturity of the contract, the data processing means retrieves the updated present day outcome of the respective phenomenon from the data storage means, determines an entitlement due for that outcome, and passes the entitlement to output means of the data processing system for exchange of the entitlement between the matched stakeholders.

7. The system as in claim 6, wherein said output means is linked with data communications means to remote locations where stakeholder accounts reside, and the data processing means causes transaction of the entitlement between respective stakeholder accounts.

8. The system as in claim 4, wherein said other-stakeholder input means receives qualification data which places qualification on which of the counter-party registering data can be used to price and/or match an offered contract, the said qualification data being stored in the data storage means.

9. The system as in claim 8, wherein said qualification data is input to the input means by parties including stakeholder guarantors, and financial or institutional regulators.

10. The system as in claim 4, wherein the data processing means is configured so that a match of an offered contract is made on the basis only of a counter-consideration being less than or equal to the said consideration.

11. The system as in claim 10, wherein the data processing means is configured so that a match of an offered contract is made with a preferred one of a counter-consideration being less than or equal to the said consideration.

12. The system as in claim 4, further comprising a credit record and a debit record for each stakeholder held with an exchange Institution, the credit records and debit records for exchange of entitlements; and the data storage means of the data processing apparatus being configured to include a shadow credit record and a shadow debit record for each stakeholder, the data processing means being configured to obtain a start-of-day balance for each shadow credit record and shadow debit record, and for every transaction resulting in an exchange obligation, adjusting the respective shadow credit record or shadow debit record, allowing only those transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order, and the data processing means further

being configured to, at the end-of-day, instruct ones of the exchange institutions to exchange transacted credits or debits to the credit record and debit record of the respective stakeholders in accordance with the adjustments of the said permitted transactions, the credits and debits be Irrevocable, time invariant obligations placed on the exchange institutions.

13. The system as in claim 1, wherein, on a match of an offered contract, the data processing means passes the matched contract to the data storage means for recordal.

14. The system as in claim 13, wherein the output means generates confirmatory documentation for each stakeholder to a matched contract.

15. The computer-based data processing system of claim 1, further includes a second counter party stakeholder input means by which a second counter-party stakeholder can input registering data.

16. A system to enable the formulation of customized multi-party risk management contracts, the system comprising:

a plurality of main data processing devices interconnected by at least one data communications link, each said data processing device running an operating system and applications software;

one or more data storage devices to which each data processing device has access;

a plurality of data input/output channels providing connection to a plurality of stakeholder locations, each said location having data processing means, and the system being programmed for:

regulating input of data, specifying a risk phenomenon, a range of outcomes for the phenomenon, and a time of maturity;

stakeholders inputting to a said data storage device by ones of the stakeholder data processing locations contract data for an offered contract, specifying an entitlement due at maturity for each outcome in the range of outcomes for a one of the predetermined phenomena, and an amount payable to a seller;

counter-party stakeholders inputting to a data storage device by ones of the stakeholder data processing locations registering data, independent of contract data entered by stakeholders, as to a likelihood of occurrence of each outcome in the range of outcomes for at least one of the predetermined phenomena;

pricing and matching a contract by the main data processing devices for at least one of the offered contracts from the seller registered data by: for an offered contract, selecting the registering data for the respective phenomenon and, in response to entitlements specified for each outcome in the range of outcomes for the phenomenon, calculating a counter-consideration, and, by comparison of the calculated counter-consideration with the consideration, matching an offered contract with at least one counter-party stakeholder.

17. The system as in claim 16, further comprising output means for each distributed data processing location whereby, on a match of a contract, confirmation is output in the form of data or documentation to respective output means for the matched stakeholders.

18. A method to enable the formulation of customized multi-party risk management contracts having a future time of maturity, the method comprising the steps of:

(a) inputting into data processing apparatus, by at least one ordering stakeholder input means thereof, contract data representing at least one offered contract in at least

one predetermined phenomenon having a range of future outcomes, and said contract data specifying entitlements due at maturity for the range of future outcomes, and consideration due to a counter-party stakeholder;

(b) inputting into said data processing apparatus, by at least one counter-party stakeholder input means thereof, counter-party registering data, independent of at least one ordering stakeholder entering contract data, as to a likelihood of each outcome in said range of future outcomes for one or more of said predetermined phenomena;

(c) storing, in a data storage means of said data processing apparatus linked with each said stakeholder input means and linked with each said counter-party stakeholder input means, said contract data and said registering data; and

(d) pricing and matching at least one of the offered contracts by data processing means of the data processing apparatus linked with said data storage means, said pricing and matching comprising the steps, for each offered contract, of:

(i) calculating a counter-consideration derived from said likelihoods and said entitlements;

(ii) comparing said consideration and said counter-consideration; and

(iii) matching a contract on the basis of said comparison.

19. The method as in claim 18, comprising the further step, before step (a), of:

(aa) inputting into said data processing apparatus, by at least one other other-stakeholder Input means thereof, predetermining data of a said phenomenon and an associated range of outcomes.

20. The method as in claim 19, wherein the step (at) further comprises inputting a predetermined time of maturity for each predetermined phenomenon and associated range of outcomes.

21. The method as in claim 20, wherein the registering data for each outcome represents a likelihood of that outcome eventuating at the time of maturity, and the step (d)(i) is performed by

multiplying elemental entitlements for each outcome with the respective likelihood;

summing the products for the range of outcomes; and

adjusting the sum at least to calculate a present day value thereof to give the counter-party consideration.

22. The method as in claim 21, comprising the further steps, following step (d), of:

(h) inputting, by the other-stakeholder input means, qualification data on which of the counter-party registering data can be used to price an offered contract.

23. The method as in claim 21, wherein the step (d)(iii) is performed by considering those counter-considerations being only less than or equal to said consideration.

24. The method as in claim 23, wherein the step (d)(iv) is performed by matching a preferred one of the counter-considerations being less than or equal to the said consideration.

25. The method as in claim 19, comprising the further step following step (d) of:

(e) inputting, by the other-stakeholder input means, data representing a present day outcome of each phenomenon.

26. The method as in claim 25, comprising the further steps, following step (e) of, at the time of maturity:

(f) calculating the entitlement for the updated present day outcome; and

(g) exchanging the entitlement between matched stakeholders.

27. The method as in claim 18 or claim 19 comprising the further step, following step (d), and before the time of maturity, of:

(m) a party to a matched contract offering a stake in the contract to other parties in exchange for a consideration, and, on acceptance of the stake and exchange of the consideration by another party, that other party becoming a stakeholder to the contract.

28. The method as in claim 18, wherein each stakeholder holds a credit record and a debit record with an exchange institution, the credit record and debit record for exchange of entitlements, the method comprising the further steps, following step (d), of:

(i) creating a shadow credit record and a shadow debit record for each stakeholder to be held independently by the data processing apparatus from the exchange institutions;

(j) obtaining from each exchange institution a start-of-day balance for each shadow credit record and shadow debit record;

(k) for every translation resulting In an exchange obligation, the supervisory institution adjusting each respective shadow credit record or shadow debit record, allowing only those transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order; and

(l) at the end-of-day, the data processing apparatus instructing ones of the exchange institutions to exchange transacted credits or debits to the credit record and debit record of the respective stakeholders in accordance with the adjustments of the said permitted transactions, the credits and debits being irrevocable, time invariant obligations placed on the exchange institutions.

29. The method as in claim 28, wherein the end-of-day instructions represent credits and debits netted throughout the day for each stakeholder in respect of all the transactions of that day.

30. The method as in claim 18, comprising the further step following step (d) of:

(n) passing matched contracts to the data storage means for recordal.

31. The method as in claim 30, comprising the further step following step (n) of:

(o) generating confirmatory documentation for each stakeholder for each matched contract.

32. A method of making a computer system, the method comprising the steps of:

(a) interconnecting at least one stakeholder data input means and at least one counter-stakeholder data input means to data storage means;

(b) interconnecting the data storage means with data processing means;

(c) interconnecting the data processing means with output means; and

(d) programming the data processing means to:

(i) accept stakeholder input data of contract data representing at least one offered contract, each offered contract specifying a predetermined phenomenon,

each phenomenon having a range of future outcomes, and each said contract data having a future time of maturity, an entitlement due for each outcome in said range of outcomes, and a consideration payable to a counter-party stakeholder;

(ii) accept counter-stakeholder registering data, independent of said stakeholder input data being accepted, as to a likelihood of each outcome in said range of future outcomes for each one or more of said phenomena;

(iii) process the contract data and the registering data to price and match a contract, said pricing including: selecting the registering data corresponding to the time of maturity for each predetermined phenomenon, and calculating a counter-consideration derived from said entitlements and said likelihoods; and said matching including comparing said consideration and said counter-consideration to match an offered contract with at least one of said counter-party stakeholders; and

(iv) output confirmatory data or documentation for each matched contract.

33. A method of exchanging obligations as between parties, each party holding a credit record and a debit record with an exchange institution, the credit records and debit records for exchange of predetermined obligations, the method comprising the steps of:

(a) creating a shadow credit record and a shadow debit record for each stakeholder party to be held independently by a supervisory institution from the exchange institutions;

(b) obtaining from each exchange institution a start-of-day balance for each shadow credit record and shadow debit record;

(c) for every transaction resulting in an exchange obligation, the supervisory institution adjusting each respective party's shadow credit record or shadow debit record, allowing only these transactions that do not result in the value of the shadow debit record being less than the value of the shadow credit record at any time, each said adjustment taking place in chronological order; and

(d) at the end-of-day, the supervisory institution instructing ones of the exchange institutions to exchange credits or debits to the credit record and debit record of the respective parties in accordance with the adjustments of the said permitted transactions, the credits and debits being irrevocable, time invariant obligations placed on the exchange institutions.

34. The method as in claim 33, wherein the end-of-day instructions represent credits and debits netted throughout the day for each party in respect of all the transactions of that day.

35. A data processing system to enable the formulation of customized multi-party risk management contracts, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a future outcome at a time of maturity, and said contract data specifying an entitlement due at maturity for each outcome in a range of future outcomes;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data, independent of said stakeholders

inputting said contract data, for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each said counter-party stakeholder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing and matching contracts from said contract data and said registering data, said pricing including calculating counter-considerations derived from said registering data relating to the phenomenon of the contract data, and said matching including comparing said counter-considerations to match an offered contract with at least one of said counter-party stakeholders.

36. A data processing system to enable the formulation of customized potential multi-party risk management contracts, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a future outcome at a time of maturity, and said contract data specifying an entitlement due at maturity for each outcome in a range of future outcomes;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data, independent of said stakeholders inputting said contract data, for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each s aid counter-party stakeholder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing contracts from said contract data and said registering data, said pricing including calculating counter-considerations derived from said registering data relating to the phenomenon of the contract data.

37. A data-processing system to enable the formulation of customized multi-party risk management contracts, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a future outcome at a time of maturity, and said contract data specifying an entitlement due at maturity for each outcome in a range of future outcomes;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data, independent of said stakeholders inputting said contract data, for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each said counter-party stakeholder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing and matching contracts from said contract data and said registering data, said pricing including calculating counter-considerations for each outcome in said range derived from said registering data relating to the phenomenon of the contract data, and said matching including comparing said counter-

considerations for each outcome in said range and over said range to match an offered contract with at least one of said counter-party stakeholders.

38. A data processing system to enable the formulation of customized multi-party risk management contracts, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a future outcome at a time of maturity, and said contract data specifying an entitlement due at maturity for each outcome in a range of future outcomes;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data, independent of said stakeholders inputting said contract data, for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each said counter-party stakeholder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing and matching contracts from said contract data and said registering data, said pricing including dividing the entitlement into integer components, and, for each component, calculating counter-considerations derived from said registering data relating to the phenomenon of the contract data, and said matching including comparing each component said counter-considerations to match an offered contract with at least one of said counter-party stakeholders.

39. A data processing system to enable the formulation of customized multi-party risk management contracts, the system comprising:

at least one stakeholder input means by which ordering stakeholders can input contract data representing at least one offered contract in at least one predetermined phenomenon, each said phenomenon having a future outcome at a time of maturity, and said contract data specifying an entitlement due at maturity for each outcome in a range of future outcomes;

at least one counter-party stakeholder input means by which at least one counter-party stakeholder can input registering data, independent of said stakeholders inputting said contract data, for one or more of said predetermined phenomena;

a data storage means linked with each said stakeholder input means and linked with each said counter-party stakeholder input means to store said contract data and said registering data; and

data processing means, linked with the data storage means, for pricing and matching contracts from said contract data and said registering data, said pricing including calculating counter-considerations derived from said registering data relating to the phenomenon of the contract data, and said matching including comparing said counter-considerations to match an offered contract with at least one of said counter-party stakeholders, and further for periodically repricing the ordering data of matched contracts, said repricing including calculating counter-considerations derived from at least some of said registering data relating to the phenomenon of the contract.

* * * * *

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 5,970,479

DATED : October 19, 1999

INVENTOR(S) :

Ian K. Shepherd

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

On the cover page, please replace "Assignees:" with --Assignee:-- and delete "Swychco Support Services Pty. Ltd., Sydney, Australia".

In column 10, line 66 and column 11, lines 4 and 13, please replace "second" with --section--.

In column 11, lines 55 and 62, and column 12, lines 19, 22 and 29, please delete "chart".

In column 22, line 62, please replace "Still, looking at the fifth stop In" with --Still looking at the fifth step in--.

In column 23, lines 22 and 37, please replace "Its" with --its--.

In column 23, line 37, please replace "Page G4" with --FIG. 60--.

In column 23, line 53, please replace "stop" with --step--.

In column 35, line 9, please replace "Processes 2 and 4—include:" with --Processes 2 and 4) include:--.

In column 35, line 48, please replace "Processes 3 and 5—include:" with --Processes 3 and 5) include:--.

In column 61, line 55, please replace "Institution" with --institution--.

UNITED STATES PATENT AND TRADEMARK OFFICE
CERTIFICATE OF CORRECTION

PATENT NO. : 5,970,479

DATED   : October 19, 1999

INVENTOR(S) :
Ian K. Shepherd

It is certified that error appears in the above-identified patent and that said Letters Patent is hereby corrected as shown below:

In column 62, line 5, please replace "Irrevocable" with --irrevocable--.

In column 63, line 32, please replace "Input" with --input--.

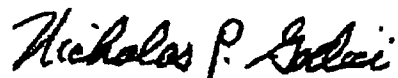In column 63, line 35, please replace "(at)" with --(aa)--.

In column 64, line 26, please replace "In" with --in--.

In column 66, line 33, please replace "s aid" with --said--.

Signed and Sealed this

Twenty-second Day of May, 2001

Attest:

NICHOLAS P. GODICI

Attesting Officer

Acting Director of the United States Patent and Trademark Office